Annual Conference

of

Manitoba Agronomists

December 15 and 16,

1938

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ANNUAL CONFERENCE OF MANITOBA AGRONOMISTS

held in the Board Room, University of Manitoba, Winnipeg, Thursday and Friday, December 15th and 16th, 1938.

President: W. J. Breakey, Experimental Farm, Morden, Man.
Secretary: Robt. Whiteman, Manitoba Department of Agriculture, Winnipeg.
Executive: Dr. J. H. Craigie; Prof. T. J. Harrison; Dr. P. J. Olson.

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C O N T E N T S.

MINUTES.

THURSDAY, Dec.15th

The group met in the Board Room at 9:30 a.m. with Mr. Breakey, President, in the chair.

The minutes of the last annual meeting were read and adopted.

A motion was moved by Dr.F.Greaney, seconded by Dr. Olson, that the chair appoint standing committees. Mr. Breakey named a nominating and a resolutions committee.

(1) The Plant Diseases Committee, under the chairmanship of Dr.F. Greaney, presented a paper by Bjorn Peterson on dates of seeding in their effect on leaf rust, also the results of sulphur dusting on stem rust.

(2) Rodents and Insects - Dr. Bird outlined the possible outbreak of grasshoppers in Manitoba in 1939.

(3) Cereals - Chairman W.H.Johnson gave an outline of the cooperative tests in the province. (b) Dr. Peterson discussed wheat variety tests. (c) Dr. Goulden summarized graph of yields of new varieties of wheat by districts.

The meeting adjourned until evening due to the Agricultural Markets Conference being held at the Fort Garry Hotel.

At 6:50 some sixty members of the C.S.T.A. and Manitoba Agronomists attended a dinner at the St. Regis Hotel, guests of the C.S.T.A. Dr. Waynes, of the University of Manitoba gave an address on Utilization of Western Agricultural Lands in Relation to Population.

At 9:15 the Manitoba Agronomists again convened and proceeded to carry out the program outlined for the afternoon. The Soils and Fertilizer Committee were billed to outline the work of the P.F.R.A. in Manitoba. Prof. Ellis, chairman, stated that due to the late hour he felt that it would not be necessary for him to go into a lengthy discussion of this subject. Further, that this work had already been fully discussed at previous meetings. Prof. Harrison, chairman of the Grain Grading Committee, called on Mr. Aitkin to report on the milling tests of the new wheats. Mr.Aitkin also discussed damaged grains and wheat grades.

FRIDAY, Dec.16th

9:00 a.m. - University.

The Forage Crops Committee, with Dr. Olson chairman, opened the morning session.

Dr. Buckley presented a paper on Corn Production in Manitoba. Considerable discussion followed. It was suggested that a committee be set up to advise the Board of Grain Commissioners re grades of corn. The committee set up are as follows: Dr. Olson, W.Breakey, W.Kroeker, W.Fraser, John Strachan.

D.A.Brown gave a paper on alfalfa growing in this province with special reference to the variation in seed production.

Prof. Ellis spoke very briefly on Land Utilization of Forage Crops.

The Weeds Committee with George Batho, chairman. Mr. Batho outlined certain weed control measures in the U.S.A.

Mr. Fraser discussed Leafy Spurge and Field Bindweed on both sides of the line.

D.A.Brown gave a paper on Crop Rotation in Relation to Weed Control.

Seed Grades Committee with F.L.Dickinson, chairman.

Mr. Heise outlined new changes in the 1938 Seeds Act.

The afternoon session with the Farm Management Committee consisted of the following:

H.J.Siemans, chairman, gave one hour and a half to this new phase of our Agronomy Conference and outlined the features to be discussed by the members of the committee.

John Crawford was first speaker dealing with Proper and Efficient Cultural Practices.

J.Racine followed with a paper on Distinctive Features of the American Appraisal System.

Dr.Sommerfeld discussed The Personal Aspect of the Farm Problem.

The Nominating Committee with D.A.Brown, chairman, gave their report and the following officers and committees were named:

President	Dr.G.F.Buckley
Vice-President	Dr.P.J.Olson
Secretary	R.Whiteman
Executive	A.H.Heise
	Dr.C.H.Goulden.

Committees

Cereal - W.H.Johnson, Chairman; J. Welsh; R.F.Peterson; D.M.McLean; R.Laidlaw; F.L.Dickinson; A. Sinclair.

Forage Crops - W.J.Breakey, Chairman; Dr.G.F.Buckley;Dr.H.B.Sommerfeld; J.E.Crawford; T.A.Johnson; W.H.Nelson.

Weeds - George Batho, Chairman; A.H.Heise; W.S.Frazer; W.H.Silversides; C.S.Prodan; D.A.Brown.

Plant Diseases - Dr.Hanna, Chairman; Dr.J.H.Craigie; Dr.M.Newton; Dr. Machacek; Dr. F.J.Greaney; E.H.Howe.

Soils and Fertilizers - Prof.J.H.Ellis, Chairman; M.J.Tinline; E.G. Minielly; H.J.Siemans.

Extension and Publicity - R.D.Colquette, Chairman; N.C.MacKay;George Batho; Wm. Mathers.

Grain Grading - T.J.Harrison, Chairman; A.T.Elders; J.E.Blakeman; W.S.Frazer.

Insects and Rodents - Dr. R.D.Bird, Chairman; Dean A.V.Mitchener; H.E.Wood.

Farm Management - J.R.Racine, Chairman; A.R.Hudson; T.L.Townsend; K. McLean; Alfred J. Strachan.

Dr.P.J.Olson was nominated President but requested that his name be withdrawn. Moved by J.H.Siemans, seconded by Prof.Ellis, that report of Nominating Committee be accepted with the exception that Dr.Buckley be President instead of Dr. Olson. Carried.

The following resolutions were read and adopted:

(1) RE PROF. ELLIS' BOOK - SOILS OF MANITOBA-- Whereas the Committee on Soils and Fertilizers have in their wisdom seen fit to make no report this year, and thus preclude a discussion of soils; and Whereas during the year the chairman of the Committee, Prof. Ellis, has published through the medium of the Economic Survey of Manitoba a most excellent monograph entitled "The Soils of Manitoba": Therefore be it resolved that we, the members of the Manitoba Agronomists' Conference, extend to Prof. Ellis our sincere appreciation and congratulation on the preparation of his book and commend it for study to all those interested in crop production in Manitoba. Moved by Prof. T.J.Harrison, seconded by Dr. Olson, Carried.

(2) PLUSH BARLEY--Resolved that we, the Manitoba Agronomists, recommend to the Manitoba Seed Board that the variety of barley known as Brandon 1099 to be named Plush be recommended for license. Moved by F.L.Dickinson, seconded by W.H.Johnson, Carried.

(3) FARM MANAGEMENT--Resolved that we, the Manitoba Agronomists, recommend that research in and the teaching of Farm Management be further extended and expanded by Federal and Provincial authorities so that the basic reasons for the success of the successful farmer may become better known and Canada's national advantage as a producer of agricultural products may thereby be improved. Moved by H.B.Sommerfeld, seconded by Dr. Olson, Carried.

(4) TIME OF SEED ACT CHANGES--Resolved that the Manitoba Agronomists recommend to the Director, Plant Products Division, that in future any changes in the Seed Act regulations be made if possible before August 1st of each year. Moved by F.L.Dickinson, seconded by C.S.Prodan, Carried.

(5) THANKS--Resolved that the Manitoba Agronomists tender a hearty vote of thanks to President Smith of the University of Manitoba and to Dean Mitchener of the College of Agriculture for their courtesy and assistance in making available the facilities of the University for the meeting held December 15th and 16th, 1938. Moved by H.B.Sommerfeld, seconded by J.R.Racine, Carried.

(6) THANKS--Resolved that the Manitoba Agronomists express their thanks to the C.S.T.A. Manitoba Branch for arranging the dinner and address the evening of December 15th. Moved by F.L.Dickinson, seconded by J.E.Crawford, Carried.

(7) THANKS--Resolved that the Manitoba Agronomists express their appreciation to the Manitoba Government for printing the 1937 report of the conference. Moved by H.B.Sommerfeld, seconded by Prof.Ellis, Carried.

(8) CORN GRADES--Resolved that we ask the following to be a committee to work out satisfactory corn grades for the Canada Seed Act-Prof.T.J. Harrison, W.J.Breakey, W.Frazer, Dr.P.J.Olson, A.E.Kroeker, James McCabe, J.D.Fraser, and that they report to this conference and be empowered to also convey their findings to the Board of Grain Commissioners for Canada. Moved by F.L.Dickinson, seconded by D.A.Brown, Carried.

(9) PUBLICITY--In view of the importance attached to timeliness and efficiency of field operations and that almost one quarter of the arable land in this province is summerfallowed each year, and that the cultural methods used for both summerfallow and second crop fields are not

generally well done, your farm management committee recommend that greater publicity as to the value of sound cultural practice be given by way of summerfallow demonstrations throughout the entire season, by the press, the radio and particularly by Agricultural Extension workers.

It is recommended that the Manitoba Agronomists set up a Tillage Publicity Committee which would collect the important experimental data on desirable tillage methods already available at different experimental farms, supplement same by local demonstrations and observations and conspicuously compare the good with the undesirable but commonly practiced methods and systematically bring them to the attention of the average farmer.

It is assumed that such a committee, if appointed, would work in closest harmony with the Extension Service. Moved by J.E.Crawford, seconded by D.A.Brown, Carried.

An amendment to above was moved by Prof. Ellis that this be placed in the hands of the Extension and Publicity Committee. This was seconded by M.J.Tinline.

After considerable discussion Mr.J.E.Crawford withdrew his original motion due to the fact that we already have a Publicity Committee; therefore another committee would not be necessary. The amendment now stands as amended.

(1) LEAFY SPURGE--We, the members of the Manitoba Agronomists in conference assembled after hearing the evidence presented on the spread of Leafy Spurge into new districts, usually starting in small patches, and after hearing the evidence presented on both cultural control and chemical destruction agree that for small patches that every effort be made to increase the use of chemicals for this purpose.

This conference further urge that the destruction of Leafy Spurge in small patches in newly infested areas be recognized as a provincial as well as a municipal duty. Moved by M.J.Tinline, seconded by H.B.Sommerfeld, Carried.

NEXT MEETING--Moved by Prof. Ellis, seconded by H.B.Sommerfeld, that the form of 1939 meeting be left to the new executive, Carried.

THANKS--Moved by Prof. Ellis that a hearty vote of thanks be tendered the outgoing executive, Carried.

Meeting adjourned to meet at call of President.

LIST OF MEMBERS PRESENT AT MANITOBA AGRONOMISTS CONFERENCE
December 15 and 16, 1938.

George A.Jones, Portage la Prairie; A.J.Clark, Deloraine; J.H.Ellis, University of Manitoba; M.J.Tinline, Exp. Farm, Brandon; Geo.G.Elias, Haskett; A.R.Judson, Dauphin; C.K.Nickel, Winnipeg; Thos.A.Graham, Winnipeg; H.Alex.Craig, Pilot Mound; E.Robertson, University of Manitoba; J.E.Crawford, Box 420, Brandon; H.J.Siemens, 542-16th St., Brandon; T.L.Townsend, Birtle; W. Harkness, Virden; W.H.Waddell, Winnipeg; B.Peturson, Winnipeg; George Batho, Winnipeg; D.M.McLean, Winnipeg; H.B.Sommerfeld, Winnipeg; R.F.Peterson, Winnipeg; K.J.McLean, Winnipeg; A.W.Wilton, Brandon; A.Lejeune, Winnipeg; J.N. Welsh, Winnipeg; F.L.Dickinson, United Grain Growers, Winnipeg; C.S.Prodan, Extension Service, Winnipeg; T.J.Harrison, Board of Grain Commissioners;

A.C.Heise, Plant Products Division, Winnipeg; R.S.Kirvan, Trust & Loan Co. of Canada, Winnipeg; E.G.Minielly, Agric. Rep., Portage la Prairie; J.H. Craigie, Rust Research Laboratory; W.E.Kroeker, Winkler; J.E.Lafrance, Agric. Rep., St. Pierre; J.M.Brown, University of Manitoba; T.A.Johnson, Carman; W.S.Frazer, Morden; P.J.Olson, University; W.J.Breakey, Morden; H.J.Siemens, Altona; H.E.Wood, Extension Service; J.E.Blakeman, Plant Products Division; A.T.Elders, Canada Malting; Mrs.Ellis, Family Herald and Weekly Star; W.H.Johnston, Brandon; B.Peturson, Rust Lab., Winnipeg; G.L.H. Buckley, Brandon; D.A.Brown, Brandon; H.A.H.Wallace, Winnipeg; J.E.Machacek, Rust Lab., Winnipeg; W.H.Nelson, Brandon; A.W.Wilton, Brandon; Chas. L. Johnston; A.J.Strachan, Brandon; Margaret Newton, Rust Lab., Winnipeg; Yum Chang Wang; R.F.Peterson, Rust Lab., Winnipeg; C.H.Goulden, Rust Lab., Winnipeg; R.D.Bird, Brandon; W.J.Cherewick; Bert Stevenson, Shoal Lake; H.C.Laidlaw, University of Manitoba; F.J.Greaney, Rust Lab., Winnipeg.

PAPERS

Plant Diseases Committee

THE EFFECT OF LEAF RUST ON THE YIELD OF THATCHER AND RENOWN.

B.Peturson and M.Newton, Dominion Rust Research Laboratory, Winnipeg, Man.

Introduction

Leaf rust of wheat, although of yearly occurrence in western Canada, generally has been regarded as rather innocuous. Losses due to leaf rust have been minimized in the past, firstly, because this rust always occurred in conjunction with stem rust, and leaf rust losses were often obscured by the much greater losses caused by stem rust, and, secondly, because the wheat varieties grown in the past have not been completely susceptible to leaf rust. Now, however, with the introduction of new stem rust-resistant varieties, it has became apparent that this rust causes considerable damage, and some concern is felt over its effect on the yield and quality of the new rust-resistant wheat varieties.

In 1938 experiments were conducted at the Dominion Laboratory of Plant Pathology, Winnipeg, to determine the effect of leaf rust on the yield of the new stem rust-resistant varieties, Thatcher and Renown. For the sake of comparison, the standard variety Marquis was also included in these experiments.

Materials and Methods

Thatcher wheat was grown in paired rod-row plots, each consisting of three rod rows spaced one foot apart. There were 25 pairs of plots. One member of each pair was dusted with sulphur to check rust development and the other members of the pair was artificially infected with leaf rust. The plots were sown on May 11, at the rate of 500 seeds per rod row. Centre rows only were harvested and the following data taken: yield, bushel weight, 1,000-kernel weight, number of kernels per head and grade.

In addition to the above described experiment, the varieties Thatcher, Renown and Marquis were grown in 1/400 acre plots under natural epidemic conditions only. These varieties were sown late (May 23) in order to permit the rust to develop fully before the varieties ripened. This test consisted of six dusted and six non-dusted plots of each variety. All three varieties were sown at the rate of 1½ bushels per acre on summer-fallowed land. The data taken for this experiment were the same as those taken for the rod-row experiment.

Experimental Results

Disease Development in the Test Plots.

(a) Leaf rust

All the non-dusted plots of Thatcher both in the artificially and naturally infected plots became heavily rusted. In the rod-row plots leaf rust infection averaged 77 per cent in the non-dusted plots and 32 per

in the dusted plots of Thatcher, and infections of this variety in the 1/400 acre plots averaged 68 and 32 per cent in the non-dusted and dusted plots respectively. The leaf rust infection on Renown average 33 per cent in the non-dusted plots and 13 per cent in the dusted plots and on Marquis infections of this rust averaged 42 and 13 per cent in the non-dusted and dusted plots respectively.

(b) Stem rust

Very slight traces of stem rust developed on Thatcher and Renown. Occasional pustules only were found on a small percentage of the plants. It was quite evident that these stray infections caused no appreciable damage.

All the non-dusted plots of Marquis became heavily infected with stem rust and moderate infections occurred in the dusted plots.

(c) Other diseases

Diseases other than rusts caused no appreciable damage, either in the dusted or in the non-dusted plots of any of the varieties.

Effect of Leaf Rust on Yield, Bushel Weight, and Grade

Leaf rust of wheat materially reduced the yield of both Renown and Thatcher. However, Renown was much less affected than Thatcher. The grade and bushel weight of both these varieties were adversely affected by this rust. The yield of Thatcher was reduced 37.02 per cent in the early-sown non-dusted plots and 51.17 per cent in the late sown non-dusted plots by leaf rust. The reduction in bushel weight of Thatcher in the early-sown and late-sown plots amounted to 3.6 and 5.4 pounds per bushel respectively, as measured by the difference in bushel weight of the grain from dusted and non-dusted plots. The non-dusted plots of late-sown Renown yielded 29.61 per cent less than the dusted plots. The bushel weight of Renown was reduced 1.9 pounds by leaf rust. In each of the above tests the grain from the dusted plots graded one grade higher than the grain from the corresponding non-dusted plots.

Owing to a heavy stem rust infestation in the Marquis plots it was impossible to measure separately the effect of leaf rust on the yield of this variety. However, the combined attack of leaf and stem rust reduced the yield of Marquis 81.38 per cent.

Table 1 gives the per cent leaf rust, per cent stem rust, yield, bushel weight, and grade of the grain from the dusted and non-dusted plots.

Table 1. The effect of leaf rust on the yield, weight per bushel, and grade of Thatcher and Renown, and the combined effect of leaf and stem rust on the yield, weight per bushel and grade of Marquis, grown in field plots at Winnipeg in 1938. Half the plots were dusted with sulphur and the remainder were left undusted.

(Table follows on page 9.)

Variety	Treatment	Time of Sowing	Leaf Rust per cent	Stem rust per cent	Yield per acre bush.	Decrease in yield per acre due to leaf rust per cent	Weight Per bushel pounds	Grade
Thatcher	Dusted	Early-sown #	32	tr	31.56	--	64.60	2°
	Non-dusted	"	77	tr	19.86	37.02	61.00	3°
Thatcher	Dusted	Late-sown ##	31	tr	23.86	--	62.10	2°
	Non-dusted	"	68	tr	11.65	51.17	56.80	3°
Renown	Dusted	Late-sown	13	tr	24.75	--	64.10	1°
	Non-dusted	"	33	tr	17.42	29.61	62.20	2°
Marquis	Dusted	Late-sown	13	30	20.15	--	61.10	2°
	Non-dusted	"	42	80	3.75	81.38	43.50	Feed Wheat

Sown May 11 ## Sown May 23.

The Effect of Leaf Rust on the Kernel Weight and Number of Kernels per head

Leaf rust reduced the size and weight of the individual kernels as well as the number of kernels per head. The greater part of the loss in yield was caused by the reduction in kernel weight. The reduction in kernal weight of early-sown Thatcher, late-sown Thatcher and Renown, caused by leaf rust, amounted to 26.47, 27.08 and 16.16 per cent respectively. The reduction in number of kernels per head amounted to 7.00 per cent in the early-sown Thatcher, 17.41 per cent in the late-sown Thatcher and 7.30 per cent in the Renown plots. Table 2 gives the weight of 1,000 kernels and the number of kernels per head of all three varieties tested.

Table 2. The effect of leaf rust on the weight per 1,000 kernels and number of kernels per head of Thatcher and Renown, and the combined effect of leaf and stem rust on the weight per 1,000 kernels and number of kernels per head of Marquis, grown in field plots at Winnipeg in 1938. Half the plots were dusted with sulphur and the remainder were left undusted.

(Table follows on page 10.)

Variety	Treatment	Time of sowing	Average Weight per 1,000 kernels. grammes	Decrease in weight per 1,000 kernels due to rust. per cent	Number of kernels per head	Decrease in number of kernels per head due to rust per cent
Thatcher	Dusted	Early-sown #	27.81	--	22.36	
	Non-dusted	"	20.45	26.47	20.79	7.00
Thatcher	Dusted	Late-sown #	22.63	--	22.40	
	Non-dusted	"	16.50	20.78	18.50	17.41
Renown	Dusted	Late-sown	30.01	--	17.80	
	Non-dusted	"	26.36	16.16	16.50	7.30
Marquis	Dusted	Late-sown	23.32	--	18.34	
	Non-dusted	"	9.80	57.97	14.88	18.81

Sown May 11 ## Sown May 23.

Discussion.

A true measure of the damage caused by leaf rust was not obtained in the experiments herein described due to the failure to completely control leaf rust in the dusted plots. If leaf rust had been controlled completely in the dusted plots the differences in yield, grade, etc., of the dusted and non-dusted plots would no doubt have been much more pronounced.

Owing to the delayed sowing of the varieties in the late-sown test, the reductions in yield of Thatcher and Renown indicated in that test are probably much in excess of the actual losses sustained generally throughout the province. However, these experiments demonstrate that leaf rust appreciably reduces the yield and grade of both Thatcher and Renown.

Cereal Committee

Chairman, W.H. Johnson
A.T.Elders, Dr. Peterson, D.M.McLean.

PART 1 - INVESTIGATIONAL WORK IN PROGRESS.

The experimental results to be reported on wheat and oats were compiled by members of the staff of the Dominion Rust Research Laboratory, where the bulk of experimental work pertaining to these two crops is being conducted.

A. WHEAT.

1. Cooperative Test of New Spring Wheat Varieties. This test was carried out at the following points :- Winnipeg, Brandon, Morden, Portage la Prairie, Gilbert Plains and Swan River. The hybrid wheats were submitted by the following institutions:

Institution	No. of varieties
Dominion Rust Research Laboratory	10
Dominion Experimental Farm, Brandon	4
University of Saskatchewan	1
North Dakota Experiment Station	2
U. S. D. A.	1

AVERAGE RESULTS FROM CO-OPERATIVE TESTS OF WHEAT VARIETIES

AT SIX STATIONS IN MANITOBA IN 1938 /1

Co-op. Test Number	Variety	Stem Rust % /2	Leaf Rust % /2	Bunt % /2	Strength of Straw (0-10)	Days to Mature /3	Yield (Bu. per Acre)
1	Marquis	80	55	16	8.1	85	15.2
2	Reward	78	60	40	8.5	84	21.2
3	Ceres	73	62	45	7.8	86	20.5
5	Garnet	82	70	4	8.0	81	13.7
501	Thatcher	1	80	24	8.6	88	32.6
106	Renown (716)	1	39*	4	8.2	91	35.9
114	R.L. 967	1	38*	24	8.0	91	34.6
118	R.L. 1097	1	8	36	8.3	90	31.9
122	R.L. 1165	1	5	9	7.6	88	36.2
124	R.L. 975.1	1	5	4	8.1	90	40.2
129	R.L. 1333	1	3	2	7.9	91	38.1
131	Renown Sel.(716.6)	1	5	1	8.7	89	38.2
132	R.L. 1189	1	18	11	8.4	91	35.2
133	R.L. 1334	2	5	26	8.4	90	32.8
134	R.L. 975.3	1	20	3	8.2	89	39.4
135	R.L. 975.6	1	5	5	8.3	88	38.5
211	C-26-44.7	1	8	18	8.6	88	39.8
215	C-25-153.7E	1	5	5	7.8	91	39.7
216	C-25-424.6A	5	65	18	8.5	88	29.5
217	C-26-123.9	1	5	28	8.5	94	37.0
304	Apex	1	65	14	7.3	93	29.3
309	Apex Sel.	2	60	9	7.1	91	31.5
602	U.S.D.A. 1098	2	32	12	6.5	93	33.8
802	N. D.	8	3	5	7.7	94	41.0
803	N. D.	4	29*	10	7.5	94	39.4

/1 The stations were Winnipeg, Brandon, Morden, Portage la Prairie, Gilbert Plains and Swan River.

/2 Data from Winnipeg tests only.

/3 Data from Winnipeg, Brandon and Morden only.

* Not pure for leaf rust reaction.

SUMMARY OF AVERAGE YIELDS FOR SELECTED VARIETIES OF WHEAT

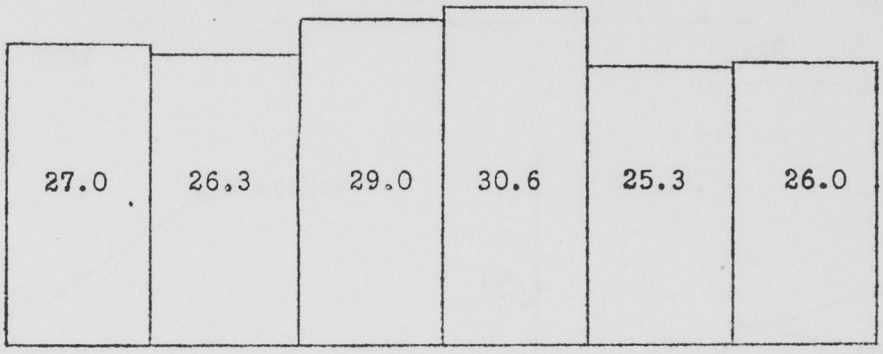
MANITOBA CO-OPERATIVE TESTS, 1933-38

	1933	1934	1935	1936	1937	1938	Mean 6 Years
Marquis	31.9	27.3	3.8	16.9	24.4	15.2	19.9
Reward	27.4	27.3	11.2	18.2	27.6	21.2	22.2
Ceres	33.4	31.7	6.9	17.4	28.6	20.5	23.1
Thatcher	35.2	35.1	28.6	20.7	37.2	32.6	31.6
Renown (716)	32.6	30.7	24.7	17.3	31.8*	35.9	28.8
Apex	32.5	30.0	18.8	17.3	31.4	29.3	26.6
Renown (716.6)	--	--	--	--	--	38.2	

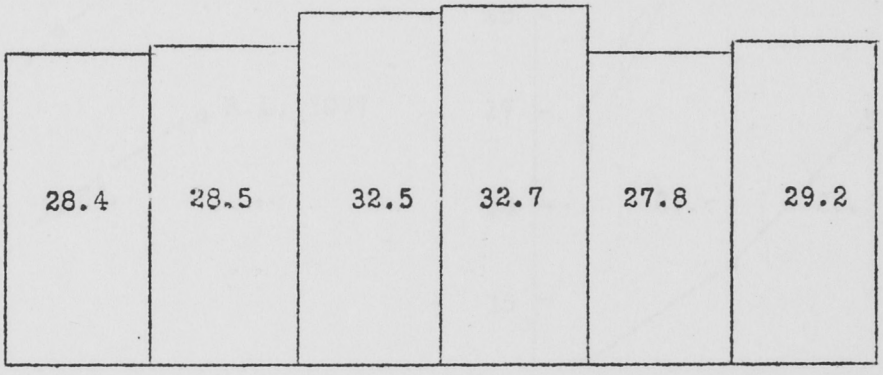
* R.L. 716.5 was tested instead of R.L. 716 in 1937.

All of the new wheats in the test are highly resistant to stem rust, and some are resistant to all three diseases, stem rust, leaf rust and bunt. The main factor influencing yield in these wheats in 1938 appeared to be leaf rust. There was a severe epidemic of this rust throughout the Red River Valley and as far west as Brandon. Four of the six stations were within this area. Thatcher was the most susceptible to leaf rust of all varieties in the test, and consequently its average yield was relatively low in 1938 although in past seasons it has been one of the highest yielding varieties. It is of interest to note the superiority of Renown Selection R.L. 716.6 over Renown R.L. 716 in yield and leaf rust resistance.

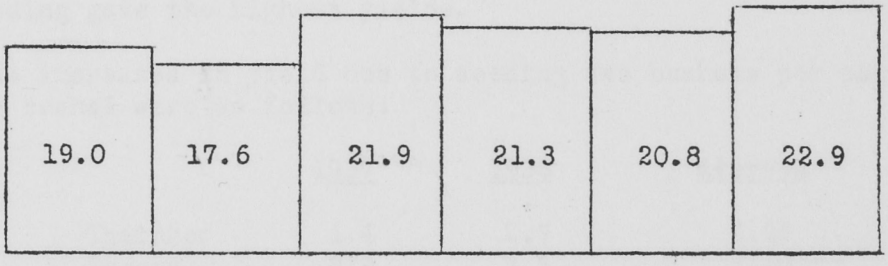
DISTRICT I



DISTRICT II



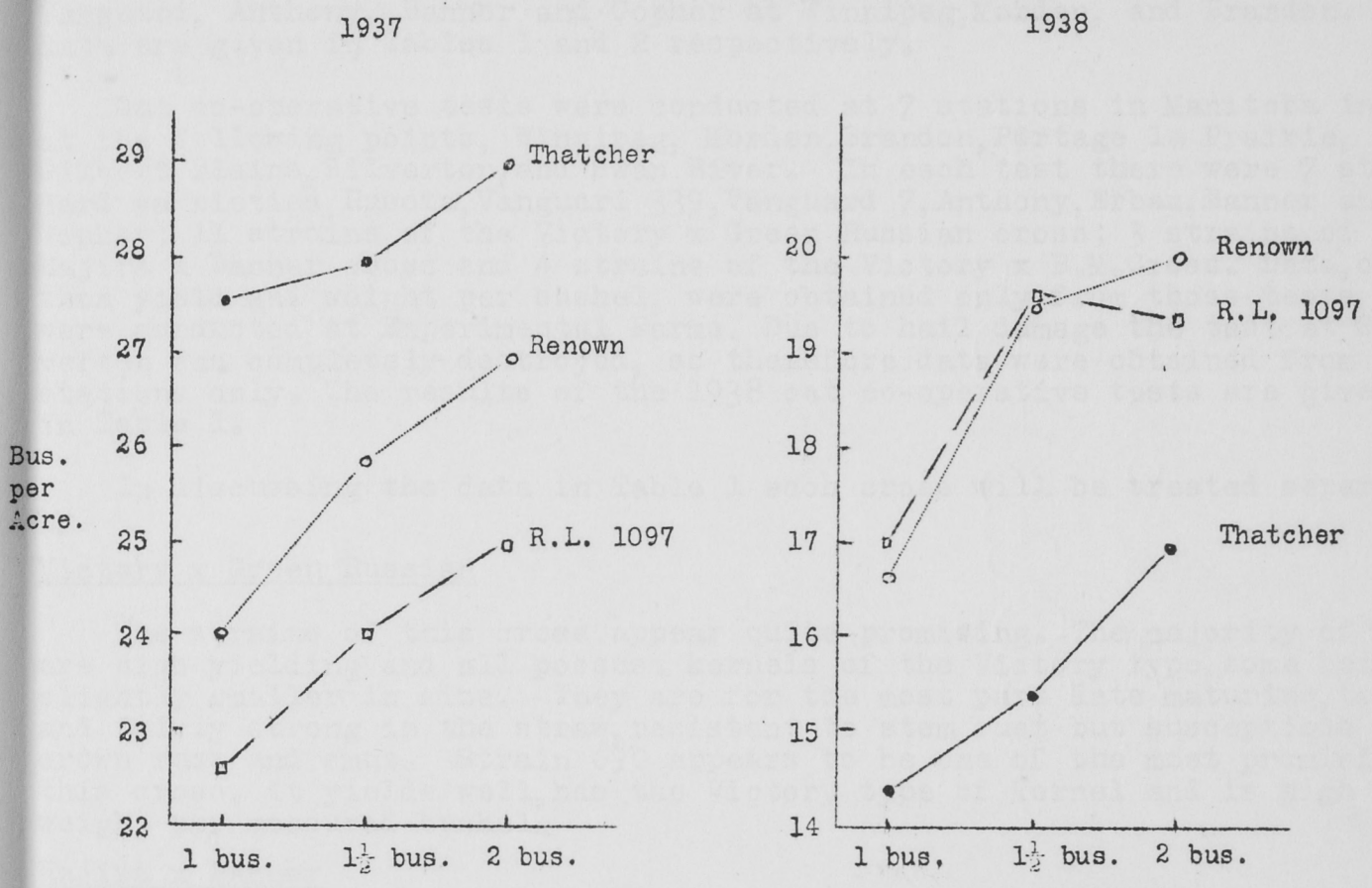
DISTRICT III



Renown R.L. 1097 R.L. 975.1 C-26 44.7 Apex Thatcher

SUPPLEMENTARY CO-OPERATIVE TESTS - GRAPH OF YIELDS OF VARIETIES BY DISTRICTS, 1938.

EFFECT OF RATE OF SEEDING ON THE YIELDS OF THREE VARIETIES OF WHEAT



In both years with the varieties Thatcher and Renown the highest rates of seeding gave the highest yields.

The increases in yield due to seeding two bushels per acre in place of one bushel were as follows:

	1937	1938	Average
Thatcher	1.4	2.7	2.05
Renown	2.9	3.3	3.10

The experiment was conducted in sets of plots in which the distance apart of the rows was varied from 1 foot to 6 inches. The reactions of the varieties were essentially the same in all types of plots.

In 1937 the two-bushel rate was superior to the one-and-a-half bushel rate for Thatcher and Renown, but in 1938 this was true for Thatcher only.

Results of Oat Co-operative Tests in Manitoba

Data are presented on the oat co-operative tests conducted in Manitoba in 1938 and on the yield results over a period of 6 years, 1933-38, for Vanguard, Anthony, Banner and Gopher at Winnipeg, Morden, and Brandon. The data are given in Tables 1 and 2 respectively.

Oat co-operative tests were conducted at 7 stations in Manitoba in 1938 at the following points, Winnipeg, Morden, Brandon, Portage la Prairie, Gilbert Plains, Silverton, and Swan River. In each test there were 7 standard varieties, Rusota, Vanguard 339, Vanguard 7, Anthony, Erban, Banner and Gopher; 11 strains of the Victory x Green Russian cross; 3 strains of the Hajira x Banner cross and 4 strains of the Victory x B.M. Cross. Data, other than yield and weight per bushel, were obtained only from those tests that were conducted at Experimental Farms. Due to hail damage the test at Silverton was completely destroyed, so therefore data were obtained from 6 stations only. The results of the 1938 oat co-operative tests are given in Table 1.

In discussing the data in Table 1 each cross will be treated separately.

Victory x Green Russian

The strains of this cross appear quite promising. The majority of them are high yielding and all possess kernels of the Victory type, some being slightly smaller in size. They are for the most part late maturing, tall and fairly strong in the straw, resistant to stem rust but susceptible to crown rust and smut. Strain 690 appears to be one of the most promising of this cross. It yields well, has the Victory type of kernel and is high in weight per measured bushel.

Hajira x Banner

The strains of this cross are resistant to stem rust but susceptible to crown rust and moderately susceptible to smut. Two of them, No's.4 and 85, are quite promising. No.4 is of the Banner type but superior to that variety in strength of straw, weight per bushel and yield, being one of the highest yielding varieties on the average for the 6 stations. No.85 is a strain that is as early maturing as Gopher and is superior to this variety in respect to stem rust resistance and yield.

Victory x B.M.

The strains of this cross are resistant to both stem rust and smut, but as they have given consistently low yields they will be replaced in future tests by other more promising strains.

Standard Varieties

All of the standard varieties in the test are susceptible to crown rust and either susceptible or moderately susceptible to smut. With regard to crown rust it is interesting to note that Erban, which is resistant to that disease in eastern Canada, is susceptible in Manitoba. Rusota, Vanguard 339 and Anthony were the highest yielding of the standard varieties and Erban and Banner the lowest. Both of these varieties were infected with stem rust, which was a factor in reducing their yield.

In summarizing the data in the co-operative test it can be stated that for the season of 1938 certain strains of the Victory-Green Russian cross and strain 4 of the Hajira-Banner cross appear to be superior to the standard varieties in size of kernel, weight per bushel, and yield.

Yield data on Vanguard, Anthony, Banner, and Gopher over a period of 6 years at Winnipeg, Morden, and Brandon are given in Table 2. The data show that Vanguard, for the average of the three stations, produced higher yields than the other varieties. It yielded 3 bushels more than Anthony, 9 bushels more than Banner and 8 bushels more than Gopher. It also outyielded the other varieties at each station, with the exception of Morden, at which station Gopher and Vanguard gave similar yields.

Table 1. Average results of oat co-operative tests for twenty-five varieties at six stations in Manitoba--1938.

Varieties	Cross	Days to Mature	Str. of Straw	Height	% Stem Rust	% Crown Rust	Wt. per Bus.	Wt. per 1000 Kernels	Yield in Bus.
602	Vic.x Gr.Russ.	84.4	8.5	42.9	0	44.6	34.2	23.9	79.5
4	Haj.x Ban.	84.9	9.1	41.4	0	37.9	36.9	23.3	78.2
53	Vic.x Gr.Russ.	83.8	8.8	39.4	0	52.9	33.8	23.8	77.8
690	"	85.4	8.6	44.2	0	40.4	36.4	25.1	77.7
567	"	83.6	8.4	42.4	0	37.5	36.2	25.1	75.3
680	"	86.7	8.8	40.0	0	34.2	33.0	24.3	75.3
741	"	86.2	8.5	41.3	0	43.8	35.0	24.9	73.2
Rusota	-	85.7	8.5	41.0	0	39.6	33.1	20.3	73.1
55	Vic.x Gr.Russ.	86.9	8.7	43.1	0	45.4	34.3	25.7	72.0
519	"	85.1	8.6	44.5	0	54.6	33.9	23.9	71.7
Vanguard 339	"	83.0	9.0	40.8	0	46.7	34.2	24.3	71.4
Anthony	"	87.2	8.0	41.7	0	45.0	34.0	25.1	70.5
654	Vic.x Gr.Russ.	87.0	8.1	42.2	0	49.2	35.1	24.5	69.5
2	Haj.x Ban.	82.4	8.7	41.3	0	42.4	34.0	24.2	68.2
Vanguard 7	-	82.0	9.1	38.4	0	47.5	33.4	24.1	67.8
536	Vic.x Gr.Russ.	85.3	8.6	43.9	0	49.4	34.3	23.1	67.0
628	"	86.4	8.8	43.4	0	46.3	34.3	23.2	66.7
463	Vic.x B.M. 1/	83.3	8.3	40.9	0	55.8	32.8	24.0	64.8
497	"	83.9	8.9	39.8	0	43.8	37.3	24.4	63.1
Erban	-	83.3	9.2	39.1	37.1	46.3	33.8	27.7	60.6
Banner	-	83.9	8.1	43.1	40.0	63.8	31.3	23.4	59.2
479	Vic.x B.M.	83.2	8.8	40.1	0	63.3	37.4	22.0	58.8
472	"	82.8	9.0	41.3	0	65.8	38.1	21.9	56.1
85	Haj.x Ban.	79.9	8.9	38.3	0	47.1	35.6	23.2	77.9 2/
Gopher	-	79.6	8.9	35.9	23.8	70.8	33.7	20.6	64.8 3/
No. of stations from which data were obtained.		3	2	2	3	3	5	5	6

1/B.M. is abbreviated form for (Minota x White Russian) x Black Mesdag.
2/ and 3/ average of 5 stations; both varieties damaged by gophers at Gilbert Plains.

Table 2. Average yields of Vanguard, Anthony, Banner, and Gopher at Winnipeg, Morden, and Brandon for the 6 years, 1933-38.

Varieties	Winnipeg	Morden	Brandon	Average
Vanguard	56.3	70.2	87.1	71.2
Anthony	54.5	66.1	82.8	67.8
Banner	50.6	55.3	80.4	62.1
Gopher	42.2	70.4	75.9	62.8

DURUM CO-OPERATIVE TEST - MANITOBA STATIONS - 1938

Fifteen durum varieties were tested at four stations in Manitoba. As a yardstick for yield the bread wheat variety, Thatcher, was included in the tests. Very favourable results were obtained at all stations, although at Melita some damage was done by grasshoppers.

The new variety R.L. 1183 again gave very satisfactory yields, being outyielded slightly by only one variety, R.L. 1248. However, the results for yield for the past four years (Table II) show that for this period R.L. 1183 was the highest yielder of the five most promising durum varieties. Thatcher was outyielded by all the new durum hybrids for the two-year period that it was in the tests. The hybrids show a distinct advantage for yield over the standard varieties.

TABLE I

AVERAGE RESULTS - DURUM CO-OPERATIVE TESTS
Four Manitoba Stations, 1938

Variety	R.L. No.	Bunt	Stem Rust	Strength of Straw	Days to Ripen.	Yield
Arnautka	570	7.0	20.1	7.2	95.2	27.1
Mindum	1344	11.0	33.0	8.1	94.6	29.7
Akrona	1252	2.5	44.3	8.0	92.4	24.9
Pelissier	1489	0.0	37.1	8.7	94.4	19.9
Kubanka	1490	0.5	58.9	8.7	88.2	3.4
Golden Ball	1250	0.0	25.1	7.2	95.8	26.6
Monad	1249	5.0	4.9	5.1	95.0	28.4
Acme	566	20.5	5.1	5.0	94.5	27.1
Ium x Min	1317	28.5	0.4	7.7	95.0	31.5
" "	1183	18.0	0.3	7.2	94.6	34.3
" "	1187	7.5	0.6	6.4	93.6	32.2
Min x Pen	1248	5.0	4.9	8.0	93.8	35.2
Pentad	203	14.0	3.1	4.9	94.4	26.0
Iumillo	7	6.0	0.0	5.3	93.8	23.8
(Min.Pen) x Min	1491	5.5	8.1	6.5	94.2	32.7
Thatcher	1246	---	5.8	7.2	90.4	26.0

TABLE II

SUMMARY OF AVERAGE YIELDS FOR SELECTED DURUM VARIETIES AND THATCHER
Four Manitoba Stations, 1935 - 1938

Variety	R.L. No.	1935	1936	1937	1938	Mean all Years
Ium x Min	1183	21.9	17.2	32.6	34.3	26.5
Mindum	1344	20.3	12.6	26.5	29.7	22.3
Arnautka	570	18.3	12.2	26.8	27.1	21.1
Kubanka	1302	2.7	12.8	29.3	3.4	12.0
Min x Pen	1248	19.9	15.8	30.5	35.2	25.3
Thatcher	1246	--	--	29.1	26.0	--

TABLE III

COMPARATIVE YIELDS - THATCHER AND SELECTED DURUM VARIETIES
For Years 1937 - 1938

Variety	R.L. No.	1937	1938	Mean
Ium x Min	1183	32.6	34.3	33.4
Mindum	1344	26.5	29.7	28.1
Arnautka	570	26.8	27.1	27.0
Kubanka	1302	29.3	3.4	16.4
Min x Pen	1248	30.5	35.2	32.8
Thatcher	1246	29.1	26.0	27.6

Yield Data in Bushels, Regional Barley Test - 1938
Dominion Experimental Farm, Brandon.

Variety	- Location - Morden	Crystal City	Melita	Goodlands	Brandon	Silverton	Swan River	Katrime	P. la Prairie	Winnipeg	Gunton	Peters-field	Mean
Br. 1099	50.9	37.4	35.6	47.6	69.6	59.7	60.0	67.0	78.9	43.3	34.2	66.3	54.2
Wisc. 38	46.9	35.2	29.2	38.5	62.0	58.8	50.0	66.4	74.6	38.8	38.6	64.7	50.3
Br. 33-9	53.2	31.8	29.0	40.9	46.8	47.3	49.7	63.3	73.3	46.2	39.0	80.7	50.1
Trebi	47.0	39.6	34.4	49.2	62.3	57.5	51.8	61.9	65.8	41.8	28.4	58.1	49.8
Br. 33-7	51.5	27.6	33.8	43.0	43.1	52.0	43.6	55.6	64.0	43.2	40.5	64.9	46.9
O.A.C. 21	37.8	32.5	30.3	39.0	58.8	54.1	54.5	57.4	69.0	35.8	32.4	59.4	46.7
Mensury	41.0	28.6	26.0	34.3	57.2	62.8	54.0	49.3	66.2	35.5	35.9	65.6	46.4
Regal	37.3	36.0	25.2	38.4	63.4	56.6	47.3	51.7	69.5	32.0	30.5	64.1	46.0
Br. 33-6	45.6	34.6	24.9	33.0	60.2	48.3	38.0	60.1	72.0	34.4	33.4	63.3	45.7
U. of A. #8	26.4	33.8	24.6	37.8	63.0	69.4	37.1	49.4	64.0	34.5	24.9	73.7	44.9
Peatland	39.8	31.9	20.1	32.9	46.7	49.1	44.4	59.4	67.4	45.3	36.4	63.2	44.7
Gartons	38.2	33.7	25.9	35.8	47.5	52.3	40.1	49.8	48.7	38.6	27.2	43.4	37.0
S. E. m	2.7	1.3	1.3	1.9	3.3	6.3	4.6	3.7	4.1	2.3	1.9	3.4	0.98
Sig. diff.	7.6	3.7	3.7	5.4	9.4	17.8	13.0	10.5	11.6	6.5	5.4	9.6	2.8

C.BARLEY- Investigational work with barley in Manitoba is centred chiefly at the University of Manitoba, Division of Plant Science, and at the Dominion Experimental Farm, Brandon.

1. Plant Science Division, University of Manitoba.

(a) Cultural experiments using O.A.C.21, Mensury, O.60 and Gartons barley and involving 3 rates of seeding, 3 dates of seeding and 3 fertilizer treatments were continued in 1938. The test was located at the following four points; Winnipeg, Swan River, Carman and Newdale. An outstanding result of these trials to date is that Gartons has suffered much less from delayed seeding than either of the other two varieties at all stations. This condition may be attributed to two characteristics of Gartons viz.- Stem rust resistance and a greater resistance to heat and drought than that possessed by commonly grown varieties.

(b) With respect to plant breeding work, efforts are centred on the problem of producing new rust resistant sorts of good malting quality. Six of the more promising lines from the cross O.A.C. 21 x Peatland were tested at several points in Manitoba in 1938.

2. Dominion Experimental Farm, Brandon.

(a) Barley Breeding. Progress in breeding for improved rust resistant varieties at the Brandon Experimental Farm has reached the point where it was possible to carry out preliminary yield tests in 1938 of some sixteen resistant varieties. In addition approximately 100 selections from crosses between Newal x Peatland and Wis.38 x Peatland have been bulked for yield tests in 1939. Threshed samples of these selections are being classified according to kernel characters viz. Bushel weight, weight per 1000 kernels, tightness of hull and texture.

Six or eight of the more promising strains tested in 1938 are to be included in the newly initiated Regional Barley Test in 1939, so that their performance over a wide range of conditions may be determined. This would involve some 14 or 15 points in Manitoba.

Arrangements have been made with the Malting Laboratory, Univ. of Manitoba, to have malting tests made of 15 of the more outstanding hybrids of which seed is available.

(b) Improvement of Gartons by Selection. The selection work reported to this Conference in 1937 has been continued and expanded somewhat. Seed from 40 head rows harvested in 1937 were sown in plots consisting of three to six 25-feet rows. Again distinct differences in straw strength, attitude of head and rust reaction were noted. Ten of the purified lines developed stem rust infection and were eliminated on this basis. Twenty rust free selections were harvested for yield tests. Of this number six selections showed better than average straw strength.

The severe rust injury to Mensury, O.A.C.21 and kindred sorts in the Portage Plains has caused a renewed interest in Gartons. Developing out of this situation, arrangements have been completed with Mr. E.G.Minielly, Agricultural Representative, Portage la Prairie, to conduct field tests with a number of the pure lines

of Gartons referred to above.

Mr. Minielly also supplied the Brandon Farm with additional sheaf material of Gartons from which further head selections have been made.

(c) Regional Barley Tests - These tests were carried out for the first time in 1938 and will eventually serve as a means of testing new hybrid barleys developed at the Brandon Farm. The 1938 tests were located at 13 widely separated points and consisted of 12 varieties- 7 standard and 5 hybrid types. A noteworthy feature of the results was the outstanding yield performance of Brandon 1099, a smooth-awned selection from a Velvet x Mensury 0.60 cross. This hybrid outyielded both Trebi and Wisconsin, commonly grown feed types in eight out of eleven tests, ranked second to Wisconsin 38 in two. It possesses, in addition, a very desirable type of head, borne in an erect manner on a stout neck. In view of its good showing in 1938 and in previous years, application has been made to the Manitoba Seed Board to have the variety licensed under the name of Plush.

(d) Effect of Stem Rust on Barley - In an endeavour to secure authentic information on the extent to which stem rust may damage barley, an experiment was carried out in 1938 having one series of plots dusted with sulphur to control rust. Two varieties were used, O.A.C.21, susceptible to rust, and Peatland, resistant. Six seedings at weekly intervals were used, commencing May 3rd and ending June 7th. Dusting the plots of O.A.C.21 every three days after the first sign of rust effectively controlled the disease whereas heavy infections developed on the undusted plots.

When seeding of O.A.C.21 was carried out on May 3rd, the reduction in yield attributable to stem rust was 30%. This loss increased to 38% by the May 17th seeding, and rose sharply to 74% by May 24th. Delaying seeding to June 1st resulted in a yield of only 4.3 bushels per acre where no dusting was done, compared to 54 bushels under rust controlled conditions. The non-dusted plots of the rust resistant Peatland gave 45.0 bushels when sown on June 1st.

Part 2. SUMMARY OF COOPERATIVE WORK.

1. Variety and Cultural Tests.

A. Wheat.

1. Dominion Rust Research Laboratory.

(a) Cooperative Test- Conducted at the following points:

Dom. Rust Research Lab., Winnipeg,
Dom. Exp. Farm, Brandon,
Dom. Exp. Station, Morden,
Mr. Geo. MacVicar, Portage la Prairie,
Mr. N. A. Robertson, Silverton,
Mr. A.H.Parker, Gilbert Plains,
Mr. J. C.Forbes, Swan River.

The varieties tested include the standards Marquis, Reward, Ceres, Garnet, Thatcher, Renown and Apex and 18 hybrids all resistant to stem rust and most of them resistant to leaf rust.

Each plot consisted of four rows one rod in length, spaced nine inches apart. Two centre rows were used for yield and notes. There were six replications.

(b) Supplementary Cooperative Test. Made possible through cooperation of Crop Testing Plan, United Grain Growers, Experimental Farms, and Western Universities. At present time this test is limited to six varieties which include five of the more promising strains from the larger cooperative test and any one of Thatcher, Renown and Apex as a check variety.

The three western provinces are divided into three regions; (1) Rust area (2) Early wheat area and (3) Drought area. The varieties selected for the test are allocated to the group to which they are best suited. In 1938 there were about 60 tests in each group, these being scattered as well as possible over the area concerned.

(c) Cooperative Test of Durum Wheats.

Carried out at the following points:

Dom. Rust Research Lab., Winnipeg,
Dom. Exp. Farm, Brandon,
Dom. Exp. Station, Morden,
Dom. Reclamation Station, Melita.

Test comprises five rust resistant hybrid wheats and the following named varieties: Pentad, Iumillo, Arnautka, Mindum, Akrona, Pelissier, Kubanka, Golden Ball, Monad, Acme, Thatcher. Each plot consists of four rod rows. There are five replications.

2. Dominion Experimental Farm, Brandon.

(a) Special Tests in Northern Manitoba.

Located at Wanless, Pikwitonei and Etomami. Varieties include Reward, Renown, Thatcher and three Brandon hybrids. Varieties sown in duplicate rod row plots.

(b) Duplicate 1/50 acre Tests at Melita Reclamation Station.

(1) Variety test consisting of Renown, Reward, Thatcher and Apex.

(2) Date of seeding common wheat (Renown) - 5 dates.

(3) Date of seeding Durum wheat (Mindum) - 5 dates.

(4) Rate of seeding common wheat (Renown) - 5 rates.

(5) Rate of seeding Durum wheat (Mindum) - 5 rates.

B.OATS.

1. Dominion Rust Research Laboratory.

(a) Oat Cooperative Tests - Located at Dominion Rust Research Laboratory, Winnipeg, Dominion Experimental Farm, Brandon, Dominion Experimental Station, Morden, Mr. Geo. MacVicar, Portage la Prairie, Mr. N.A.Robertson, Silverton, Mr. A.H.Parker, Gilbert Plains, Mr. J.C.Forbes, Swan River.

The varieties tested include 18 hybrids, and seven named varieties as follows: Vanguard 339, Vanguard 7, Anthony, Banner, Gopher, Erban and Rusota.

The plots consisted of four rows, one rod in length, and nine inches apart. There were four replicates.

(b) Supplementary Oat Cooperative Tests - Tests made possible through cooperation of Crop Testing Plan, United Grain Growers, Experimental Farms and Western Universities. Sixty tests scattered throughout Manitoba and oat growing regions of Saskatchewan.

2. Dominion Experimental Farm, Brandon.

(a) Special Tests in Northern Manitoba. Tests located at Wanless, Pikwitonei, and Etomami. Varieties include Anthony, Gopher, Vanguard 7. Rod row plots sown in duplicate.

(b) Duplicate 1/50 acre plots at Reclamation Station, Melita.

(1) Variety Test of Vanguard, Anthony, and Gopher.
(2) Date of Seeding, using Vanguard (6 dates).

C.BARLEY.

1. Division of Plant Science, Univ. of Manitoba, in cooperation with U.G.G., Canada Malting Co., and Dominion Malting Co.

(a) Cultural Experiment Using O.A.C.21, Mensury O.60 and Gartons.

This test involved three rates of seeding, three dates of seeding, and three fertilizer treatments. Tests located at Winnipeg, Swan River, Carman and Newdale.

2. Division of Plant Science, Univ. of Manitoba, in cooperation with the Extension Service, Manitoba Dept. of Agriculture. Financial assistance U.G.G., Canada and Dominion Malting Cos.

(a) Test of Rust Resistant Hybrid Barleys. A test for yield and malting quality of rust resistant selections from the cross, O.A.C.21 x Peatland. Conducted at six points in the province.

3. Dominion Experimental Farm, Brandon.

(a) Regional Barley Test - Conducted at the following points - Crystal City, Morden, Goodlands, Melita, Brandon, Silverton, Gilbert Plains, Swan River, Katrime, Portage la Prairie, Winnipeg, Gunton and Petersfield. The varieties comprised five hybrids and seven named types as follows: Wis. 38, Regal, O.A.C.21, Mensury O.60, Peatland, Gartons and Trebi. Plots in quadruplicate.

(b) Duplicate 1/50 acre plot test at Reclamation Station, Melita.

(a) Date of seeding barley using Wis. 38 (7 dates).
(b) Special Tests in Northern Manitoba. Wanless, Pikwitonei, and Etomami. Varieties tested: O.A.C. 21, Mensury, Peatland, Wisconsin 38.

4. Cereal Division, Central Experimental Farm, Ottawa.

(a) Uniform Barley Test - Consisting of 25 of the more promising named varieties. Located at Univ. of Man., Winnipeg, Dom. Exp. Farm, Brandon, Dominion Exp. Station, Morden, A.H.Parker, Gilbert Plains.

D. FLAX.

(a) Special Test in Northern Manitoba- Wanless, Pikwitonei, and Etomami. A comparison of Bison and Redwing. Varieties in duplicate rod row plots.

2. Demonstration or Observation Plots.

(a) Extension Service, Manitoba Department of Agriculture. Forty-one sets of demonstration plots widely distributed over Province - Crops include 10 varieties of wheat, 9 of oats, 9 of barley, 7 of flax and 6 or corn.

(b) Dominion Experimental Farm, Brandon.

(1) District Experiment Substations. Plots at Goodlands, Boissevain and Crystal City - Newer varieties of wheat, oats and barley.

(2) Illustration Stations -Plots located at Swan River, Gilbert Plains, Ste Rose, Plumas, Katrime, Gunton, Arborg, Petersfield, Dugald, Roblin, Silverton and Birch River.

Varieties tested include: Wheat - Reward, Renown, Thatcher and 3 Brandon hybrids. Oats - Banner, Anthony, Gopher, Vanguard #7. Barley - O.A.C.21, Mensury, Peatland and Wisconsin 38. Flax - Bison and Redwing.

(c) Crop Testing Plan.

Demonstration plots at 600 points in western Canada, comprising the newer varieties of wheat, oats and barley. Tests in Manitoba widely distributed.

3. Crop Testing.

(a) Crop Testing Plan. An association of eight elevator companies under direction of Major H.G.L.Strange-The Searle Grain Co., The British America Elevator Co. Ltd., The Northern Elevator Co., National Elevator Co. Ltd., Federal Grain Co. Ltd., Alberta Pacific Grain Co. Ltd., Home Grain Co., Midland Pacific Grain Co. In 1938 some 20,000 samples of farmers grain (mostly wheat) in Western Canada were collected, grown and classified as to varietal purity. This organization also distributed in 1938 70,000 bushels of registered and certified seed.

(b) National Barley Committee, cooperating with Canada Malting Co., and line elevator companies. To date have grown and classified over 3,000 farmers barley seed samples.

(c) Dominion Illustration Station, Roblin. Forty-seven farmers contributed samples from wheat being used as seed in 1938. These were placed in small plots and classified according to purity as to variety.

4. Junior Seed Growers Clubs.

Conducted by the Extension Service, Manitoba Department of Agriculture, with financial assistance from Manitoba Pool Elevators Ltd., United Grain Growers Ltd., Canada Malting Co. McCabe Bros. Grain Co. Ltd., have cooperated with Extension Service in operating flax clubs at Ochre River and Dauphin.

There were 103 clubs operating in Manitoba in 1938 with a total membership of 1098 growing pure seed of cereal crops, corn and forage crops.

5. Miscellaneous.

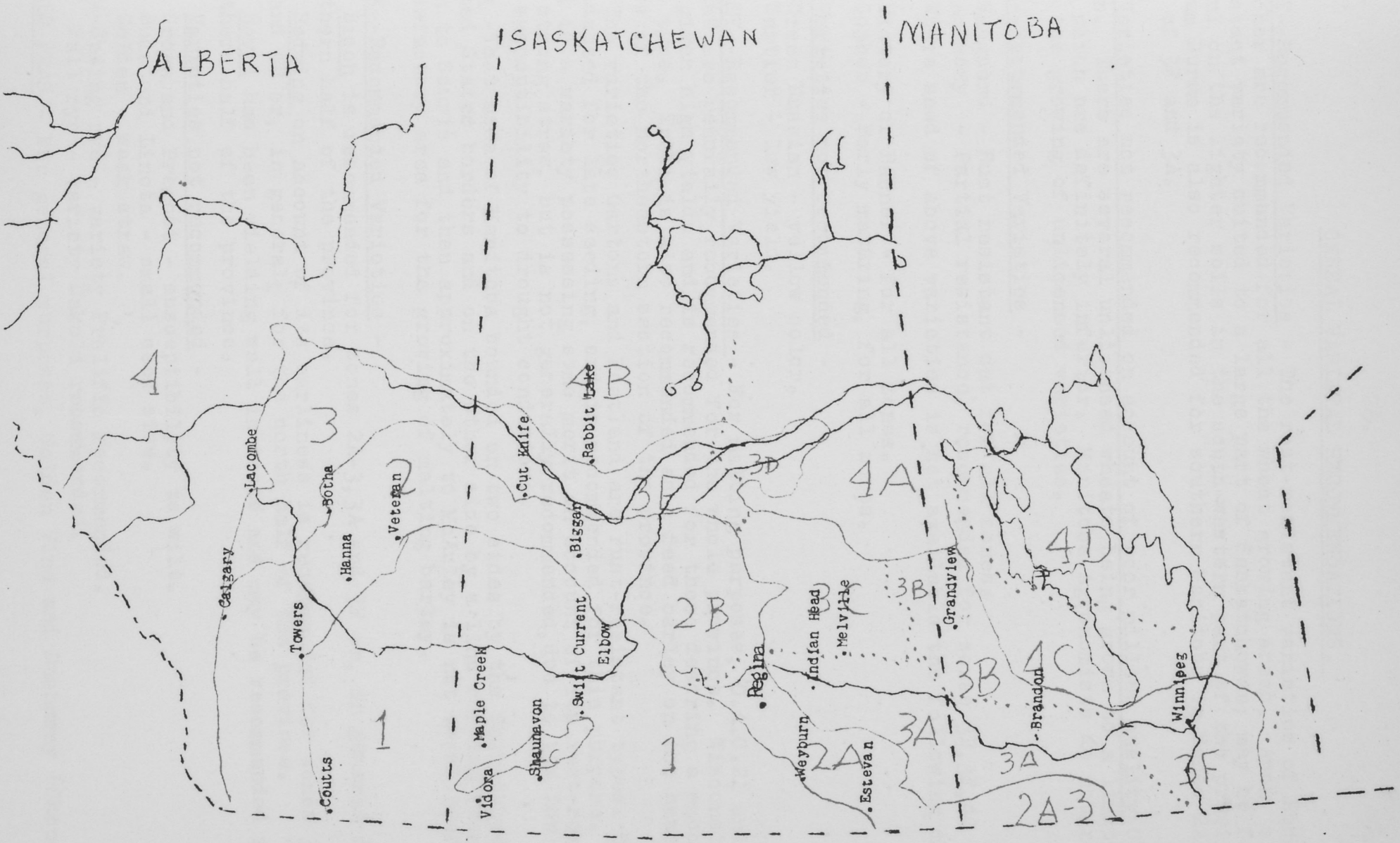
(a) Crop Improvement Clubs - A cooperative effort between Manitoba Pool Elevators and Extension Service. Clubs established at Pool Elevator points. Membership made up of farmers each of whom grows only the variety chosen by the club. Only registered or certified seed may be used and not more than ten acres of grain may be sown. Seventeen clubs chose Thatcher or Renown, one grew O.A.C.21 barley and one Banner oats.

(b) Corn Testing Plants. McCabe Bros.Grain Co., are cooperating with the Manitoba Dept.of Agriculture in developing the corn industry in Manitoba. Seed corn testing plants are being established at Carman, Boissevain and Winnipeg.

(c) Canada Malting Co., and Dominion Malting Co., contribute to the Shea-Drewry Barley Improvement Fund, which is administered by the Manitoba Barley Improvement Committee as a revolving seed fund.

Cereal Committee, Manitoba Agronomists,
W.H.Johnson, (Chairman)
R.F.Peterson,
D.M.McLean,
A.T.Elders.

Soil Climatic Zones - Sir Cereal Committee Report.



CEREAL VARIETAL RECOMMENDATIONS.

WHEAT--Recommended Varieties - The rust-resistant varieties of Renown and Thatcher are recommanded for all the wheat growing areas. Apex, a rust-resistant variety suited to a large part of Saskatchewan, may be found useful on the lighter soils in the south-western part of the province. Mindum Durum is also recommended for southern Manitoba in Zones 2A, south half of 3F and 3A.

Varieties not recommended on account of poor milling quality-Coronation. There are several unlicensed wheats being grown to a limited extent which are definitely inferior. Manitoba Agronomists do not recommend the growing of unlicensed varieties.

OATS--Recommended Varieties -

Vanguard - Rust resistant oat for all zones.
Anthony - Partial resistance, recommended for zones 3B,3F,4C and 4D.

Where seed of above varieties is not available the following may be used:

Victory or Banner - for all zones.
Gopher - Early maturing, for all zones.

Varieties not recommended -

Green Russian - yellow color.
Cartier - low yield.

BARLEY--Recommended Varieties - For malting purposes, O.A.C.21 and Mensury Ott.60 are generally recommended for the whole province. Wisconsin 38 has given high yields and is recommended for those desiring a smooth-awned feed type. Trebi is also recommended as a feed barley on the heavier soils of the northeastern section of the province.

The varieties Gartons and Peatland are rust-resistant types. Gartons is adapted for late seeding, and is recommended for this purpose. Peatland is a variety possessing some merit on account of its rust-resistance and strong straw, but is not generally recommended, due to its low yield and susceptibility to drought conditions.

Note -That area of Manitoba bounded on two sides by the Saskatchewan and United States borders and on the other side by a line running from Boissevain to Souris and then approximately to McAuley is not considered a satisfactory area for the growing of malting barley.

FLAX--Recommended Varieties -

Bison is recommended for zones 2A-3, 3A and 3F or, in general for the southern half of the province.

Redwing on account of its earliness is recommended for zones 3B, 4C, 4A and 4D or, in general, for the north half of the province.

Royal has been yielding well in tests and may be recommended for the southern half of the province.

Varieties not recommended -

Crown and Premost - susceptibility to wilt.
Buda and Linota - small seed size.
Golden - weak straw.

RYE--Spring rye - variety Prolific recommended.
Fall rye - variety Dakold recommended.

FIELD PEAS - For general purposes, Golden Vine and Dashaway (Chancellor).

Forage Crop Committee

ALFALFA SEED PRODUCTION IN MANITOBA AND A DISCUSSION ON THE PROBLEM OF SEED-SETTING.

By D. A. Brown, Brandon, Man.

Only during recent years has alfalfa seed production assumed important proportions in Manitoba. The 1934 provincial crop did not exceed 30,000 pounds. In 1935 it rose to 60,000, and in 1936 to 125,000. In 1937, a good seed year, the total reached 300,000 and in 1938 425,000 pounds. While on an average production was doubled each of those years, this does not signify that the yields per acre have been increasing. Statistics are not clear as to the acreages from which this crop was harvested, but it appears safe to estimate that the rapid increase in production has been largely brought about by a greatly increased acreage rather than higher per acre yields. This assumption is supported by the fact that the 1935 and 1938 crops over the province as a whole gave low yields, yet the total production in these years was very much larger than in the two previously good seed years of 1934 and 1937.

UNCERTAINTY OF THE ALFALFA SEED CROP - Unlike other farm crops when grown for their seed, there can never be an assurance of a favorable yield from alfalfa even in localities where conditions appear to favor this crop. Ten years ago Prof. W. Southworth, of the University of Manitoba, wrote (16) that it was now generally well recognized by experienced growers of alfalfa seed that the crop produced in different seasons is exceedingly variable both in quantity and quality. He indicated that in certain areas both soil and climatic conditions were apparently unfavorable for seed setting and that in these regions no known cultural practice nor special strain gave rise to even a moderate seed setting. Even in localities where conditions appear to favor this crop in some seasons, the setting is low and the grower experiences disappointment.

With an increase in the acreage there naturally has developed a parallel increase in the interest taken by Manitoba farmers in this crop. It therefore ocassions little surprise when numerous questions arise at farmers' meetings or come to one's attention by correspondence, asking why alfalfa sets seed well one year and the very next year absolutely will not set a worth while crop. And well might the farmer so interrogate the agriculturist whom he expects has a satisfying answer, for is there not considerable economic importance attached to the situation of the farmer who carefully seeds 20, 40, or 100 acres for seed production purposes, spends a lot of time roguing this field only to discover that the plants fail to set seed? Perhaps his first year of experience has brought him a good yield and a newly discovered sideline which brings welcome dividends, but the very next year his crop "plays him false" and he despairs of the returns which he perhaps does not yet know are so elusive.

The writer has had so many questions relative to this problem to deal with in 1938 that a decision was reached to review information available in order that the best possible answer could be given to questions when received. There has been difficulty in giving clear cut statements in the past, and little wonder, because research workers, although agreeing in one or two major details as to why alfalfa is a shy seeder, appear to find

their evidence on many minor details highly conflicting.

In order that a study of the present status of this crop in Manitoba could be made, and that an opinion relative to conditions which seem to favor seed setting could be formed, a questionnaire was submitted early in November 1938 to 170 growers. These were farmers who had their crop inspected either for purposes of registration or certification. They all resided within Manitoba with the exception of several in the Rainy River district in Ontario and the Hudson Bay Jct. district in Saskatchewan. The questionnaire had fourteen questions. Within one month 51% had sent in a full list of answers. Much interest was shown by many who replied, and, not only did they file answers to all questions, but wrote long letters giving their varied experiences with this crop and their opinions regarding it.

THE QUESTIONNAIRE AND A SUMMARY OF INFORMATION CONTAINED IN REPLIES -

1. How many years have you grown alfalfa seed? 64% had only grown this crop from one to five years. Of the remaining 46% only 4% had grown alfalfa for seed more than 10 years. The inference is that alfalfa for seed purposes is a comparatively new crop in Manitoba.

2. How many years was the seed setting good? How many poor? 295 crops were reported of which 56% in the opinion of growers were classified as fair to good and 44% poor.

3. Is your crop grown in rows or broadcast? 78% of growers seeded broadcast. 19% seeded in rows only (36" rows). The remaining 3% seeded both in rows and broadcast.

4. Does seed set best during the first year after seeding down or in succeeding years? 55% reported their best crops from the first year after the seeding was done; 23% from the second year and 22% from the third or succeeding years. From subsequent crop yields from the same field given by 13 growers a chart was prepared showing the trend of yields from the first to the 6th year. The chart is attached.

5. How long do you leave your fields in this crop? By far the majority replied 4 to 6 years. Only a few on the richer soils reported that they left the field indefinitely as long as it was producing profitably.

6. Do you surface till the seed crop field in the spring? Very few surface tilled either in fall or spring. Those that did, used a combination of cultivator and harrows or disk and harrows. One reported ploughing his field to a shallow depth after which he obtained his best seed crop.

7. What kind of soil (a) surface (b) subsoil, is on your alfalfa field? All returns gave useful answers as to the soil structure, texture, color, etc. It was evident in the alfalfa seed districts between the Manitoba Lakes, in the Swan River district and the Etomami settlement of Saskatchewan that soil was not a primary limiting factor to the yield of seed obtained.

8. Do you locate your seed field on level, rolling, low or high land? The majority of replies stated that fairly high rolling land was used. It was the consensus of opinion that high land was best. In this

whether it was rolling or level did not appear to make much difference.

9. Give, if possible, yields of seed per acre for each year crop has been grown. The 295 crops reported ranged in yield from complete failures to 900 pounds per acre. The average was 214 pounds.

10. What were weather conditions like during flowering and seed setting each year? This question sought information which was probably difficult to recall, but growers who had from one to three years experience, gave very good answers. From a summary of answers growers believed that wet, or moist weather was the chief cause of crop failures. A surprisingly large number remarked that hot dry weather seemed to kill the blossoms and caused them to drop off. Not a few said they believe showery weather gave best seed crops.

11. What influence does thinness of stand and height of plants have on seed setting? This question provided the greatest variety of opinion. Some thought thin stands gave rise to more seed per plant, but that thick stands would yield more per acre. Thin crops were weedier. Tall crops lodged and set little seed. Many decided that density of stand and height made little difference as long as the weather was favorable.

12. Are there other factors you may have observed that favor or prevent the setting of seed? To this question came such replies as:

(a) Hot dry weather dries up flowers and they drop.
(b) Wet weather prevents seed setting.
(c) Moderately cool weather is best.
(d) Insects seem to help.
(e) Windy dry weather is best.
(f) Wind has no effect. There is more seed where the field is protected by bush.
(g) Clipping the field early in June induces more seed to set.
(h) Disking the field in spring or early June stimulates seed production.
(i) Rich loam soil is no good for seed. Gravel is best.
(j) Early bloom does not set seed so well as later bloom.

13. Have you tried mechanical means for tripping flowers? Nineteen out of 82 tried mechanical means for tripping flowers. Eighteen alleged that it did no good. One (Garnet C. Dicks, Teulon, Man.) reported using a specially home made tripping machine which gave good results in 1938. Methods used by some growers were: Dragging chains, heavy ropes, poles and wire. In some cases the horse rake was used. While not a mechanical means, one grower reported that five men trampled a lot through his field when roguing. He expected this would help, but later there was no evidence that it had.

14. Do you take your seed from the first cutting each year? Ninety-five per cent of replies were in the affirmative. The consensus of opinion favored the first cut because a later growth was likely to suffer from drouth, or from a late seed setting which would be damaged by frost, or it would be spoiled by early autumn rains.

The information contained in these replies may help to crystallize opinion relative to the following:

(a) The districts in Manitoba most suitable for alfalfa seed production.
(b) The best cultural practices.
(c) The most favorable kind of soil.
(d) The best location for the field.
(e) About what yield may be expected on the average.
(f) The usefulness of mechanical contraptions for tripping flowers.

From these opinions we may more clearly make recommendations to prospective growers. In order, however, that agricultural workers may become more conversant with the tremendous amount of research work which has been proceeding for many years on alfalfa seed production, and in order that there may be a fuller appreciation of the difficulties involved and the apparent inability to arrive at a practical solution, a brief summary of the more important findings of research work is presented.

SUMMARY OF RESEARCH WORK DIRECTED TOWARDS DETERMINING WHY ALFALFA IS AN ERRATIC SEED SETTING PLANT.

THE INFLUENCE OF CULTURAL PRACTICES - For the most part cultural practices have not proved beneficial. Row culture vs. broadcast seeding appears to make little difference. Fertilizers have helped by chance when weather was favorable. Clipping back early in June depends so much on subsequent weather that it is of doubtful merit. The same can be said of early summer surface tillage. Southworth (16) sums up cultural practices in relation to seed setting by stating that there is much uncertainty about the value of any known cultural methods for overcoming erratic seed setting. He says that one can appreciate the position of the experienced grower when he states that he never feels certain of what the yield will be until he sees the seed in the sack.

THE INFLUENCE OF SOIL AND LOCATION - The influence of soil has not been definitely established by research workers. In fact the apparently greater influence of weather has occupied the larger part of scientific investigation. However, it is true that when this crop is grown in humid districts, on soils inclined to be somewhat open and porous and which contain an abundance of lime, there seems a greater tendency of plants to set seed than on heavy damp soils in the same district. In general, the heavy rich black loams induce too great a vegetative growth to expect much seed, while the gravelly soils or clay ridges high in limestone appear to develop a plant more prone to seed setting. This observation is qualified to some extent by the fact that over 90% of all alfalfa seed growers in Manitoba are situated in the high limestone soil regions. From this region came the bulk of replies to the questionnaire which forms the basis of this article.

In October, 1938, correspondence, Dean Kirk of Saskatoon says: "I was through the White Fox district of Northern Saskatchewan four times this summer watching the development of alfalfa and the set of seed. Generally speaking it seemed to me that the more the soil had been degraded by leaching, the better was the condition for seed production. Occasionally there were exceptions to this rule, but not many. Some of the best crops were on almost white soils and in one area a highly infertile sand produced enormously heavy crops when fertilized, but the subsoil at a depth of 18 to 20 inches was heavy clay. Personally, I think there is a high negative correlation between the amount of available

nitrates in the soil and the yield of alfalfa seed. As I see it, the lack of nitrogen restricts vegetative growth and favors seed production. Such an explanation, however, while containing a lot of truth is far from being a complete explanation. For one thing our podsol soils in the North, unlike those in most parts of the world, are not markedly acid; on the contrary they are close to the neutral point. Moreover, there is a strongly developed lime layer about two to three feed below the surface and this no doubt is very favorable to the alfalfa seed crop."

INFLUENCE OF WEATHER CONDITION. According to investigations this is by far the most important factor related to seed setting. Stewart (15) states that all large alfalfa seed producing zones are in arid or semi-arid regions. Martin (13), working in Iowa, stated that moisture was by far the most important factor influencing the fertility of the alfalfa flower. J.C.Alter (2) Meteorologist, United States Weather Bureau, relating the weather to alfalfa seed production, says -

(a) The alfalfa plant, when considered for seed, is very exacting in its meteorological requirements.
(b) Climate is the limiting factor in seed production generally. A certain strain on the plant due to drought seems necessary to force the setting of seed.
(c) Humid climates may be considered unfavorable.
(d) The summer must be dry to produce seed rather than leaf and stem, yet moisture must be ample and timely for filling the seed.
(e) When moisture is deficient and dry hot winds are prevalent, particularly at blossoming time, many flowers will wilt and fall instead of becoming fertilized.

Why should moisture be the chief limiting factor?
Why should the best seed crops in Manitoba be in the more humid regions?
Why in the dry south and west is alfalfa for seed grown so little in the light of the statement that dry climates are most favorable?
Why in 1938 was the crop so good in the northern parts of Manitoba and the north-eastern sections of Saskathewan where a wet summer was experienced?

Engelbert (9) showed that heavy rainfalls during July in Peel County, Ontario, depressed the yield of seed while a limited amount of rainfall in July, when uniformly distributed, provided the best conditions for seed production.

It is fairly generally accepted that the alfalfa flower under most conditions must trip to ensure seed setting. Under greenhouse conditions at Ottawa and Saskatoon, Armstrong and White(3) state that pod-setting was shown to depend upon flower tripping. Prior to their investigations Kirk and White(12) had selected an autogamous plant at Saskatoon from which it was hoped to develop a strain of high seed setting alfalfa, but Armstrong and White(3), working with this selection under glass, stated that the high seed setting capacity of these plants was largely due to the fact that fertilization was accomplished by spontaneous tripping of the flowers. They went on to show in their work that as flowers tripped the stigma struck the standard and was ruptured. Their work showed this to be necessary for fertilization. Pollen grains lodging in this broken

surface, came in contact with the released stigmatic fluid which appeared essential to the growth of the pollen tube. The findings of Armstrong and White(3) were, however, later challenged in certain respects by Brink and Cooper(6), workers in Wisconsin. Their work showed that the stigmatic membrane did not necessarily need to be ruptured to provide a proper growth medium for pollen grains, nor was it necessary for blossoms to trip to make possible fertilization. Under very dry outdoor conditions on the University farm at Madison in 1936, they had good seed setting from blossoms which had not tripped. They draw these interesting conclusions:

(a) Under greenhouse conditions in winter tripping is practically indispensable to seed setting, but in the field many pods may develop from untripped flowers.

(b) The extent to which the stigmatic film acts as a block to pollination in the untripped flower varies greatly. The behaviour of this membrane probably accounts for much of the irregularity in seed setting in the field.

(c) The amount of aborted pollen may be large enough to limit seed formation, but this is not generally an important factor.

(d) Sometimes, but rarely, pollination in the untripped flower may be prevented by an abnormal positional relationship between stigma and anther.

Clarke and Fryer(8) found, under field conditions at Edmonton, that a small percentage of seed pods set from untripped flowers, but that tripped flowers accounted for the great percentage of seed set. Moisture has an extremely important influence upon tripping. Hay(11) studied the effect of artificial tripping at Lethbridge and concluded that it did not materially increase seed setting and stated that lack of tripping was not the limiting factor. Southworth(16), however, emphasized the importance of tripping in determining the seed yield. From Carlson's(7) work in Utah a marked contribution is made on the behaviour of alfalfa flowers and why seed may set and why it may not. For four years he studied the seasonal behaviour of alfalfa flowers as related to seed production. His work has a direct relationship to the findings of Armstrong and White(3) that pollination took place almost entirely in the second or upright bud stage and before the flower fully opened. Carlson states that when flowers are from one to three days in the full bloom stage the chances of seed setting are great, but if they remain longer than three days in full bloom, seed setting drops off very rapidly. Furthermore, even though they pass quickly through full bloom, if they remain longer than three to five days in the wilted stage, seed setting is doubtful. It would seem then that moist conditions which retard the rapidity with which the flower passes from stage to stage will result in a lower seed setting. He further found that alfalfa flowers are capable of forming pods rather freely in the absence of tripping.

A review of the immense amount of work done in relation to the fertilization of the alfalfa flower shows definitely that the reasons why seed sets or does not set are largely due to the structure of the flower and the dynamic relations of its parts. Alfalfa pollen is extremely delicate in its requirements for growth. There is the influence of the presence or absence of moisture; the stage of the pollen when it

comes in contact with the stigma; the stage of stigmatic growth and whether the essential secretions are present to germinate the pollen and give rise to the normal growth of pollen tubes; the receptiveness of the ovule as well as other allied factors. Temperature must be just right for pollen growth. It is possible that showers of rain, intermingled with bright sunshine, warmth and wind aid greatly pollen growth.

Summarizing the influence of moisture we assume:

(a) From the results of the majority of workers that a high percentage of tripping in alfalfa flowers has a positive correlation with seed setting.

(b) That moisture as a single factor has greater influence upon tripping than any other agency yet brought to light.

THE INFLUENCE OF WIND:- The majority of growers, in their replies to the question, referring to wind, expressed the belief that it had little influence on seed setting. This substantiates the investigations of Gray (10) working at Lethbridge who found that wind is a very ineffective agent for tripping alfalfa flowers and that this would be its chief mode of assistance in the matter of seed setting.

THE INFLUENCE OF TEMPERATURE - While certain early investigators in the U.S. believed that alfalfa set seed better when extremely high temperatures prevailed (up to 100°F) this assumption has since, from several quarters, been discredited. Bolton and Fryer (4) believed that temperatures of 70°F to 85° tend to accelerate pollen tube growth in alfalfa at least when compared with temperatures of approximately 55°F. That extremely high temperatures are not essential may be assumed from the fact that the best Canadian seed crops are now grown in the most northerly farming communities where summer temperatures seldom go above 90°F. On numerous occasions the writer has observed fields of alfalfa on Manitoba Illustration farms setting extremely heavy crops of seed under favorable September weather conditions during a time when the temperature rarely exceeds 85°F.

THE INFLUENCE OF SUNSHINE - Piper and his co-workers (14) have shown that hot sunshine induces automatic tripping and that flowers thus tripped produced the highest percentage of seed. Aicher(1) was another worker who believed that the number of days of sunshine during the summer season has a close correlation with seed setting. May not the longer days of sunshine during July in the northern regions be one of the factors responsible for better seed crops in these areas than are usual further south?

THE GENERAL INFLUENCE OF WEATHER - Following a very complete study in 1931 of seed setting in Peal County, Ontario, and following an intensive study of research work done up to that time, Engelbert(9) states "summing up in general from various writer's statements it may be said that before the blooming period there must be sufficient moisture for vigorous growth of alfalfa plants. Near and during the first part of the blooming period a dry spell sufficient to put the necessary 'strain' on the plant to induce seed setting is needed; during the rest of the blooming period light showers now and again are beneficial as a certain amount of moisture is needed for fertilization. When the young pods are formed, heavier rains are favorable to provide the moisture necessary for the filling of the pods. Stripping of the flowers in the blooming period is due to failure of fertilization and can be caused by extreme moisture, or extreme heat with frequent high, dry winds."

THE ENFLUENCE OF MECHANICAL TRIPPING - Growers answering this question found no benefit from various mechanical contrivances which were used. Carlson's(7) studies relating to the behaviour of alfalfa flowers may shed light as to why mechanical contrivances for tripping prove futile. Artificial tripping by large scale means is usually resorted to in a wet season. Under the influence of excessive moisture it is doubtful if many flowers are induced to trip. Even if tripping is done it may be that it came too late. In other words it is done after the blossom has been in the healthy state longer than the 3 to 5 day period prescribed by Carlson as the optimum fertilization stage. Going a step further, even if tripping is done within this vital period, it is possible under prevailing weather conditions that the blossoms remain longer in the wilted stage than the optimum time for seed setting as prescribed by Carlson.

THE INFLUENCE OF INSECTS - The consensus of opinion expressed by farmers replying to the questionnaire was to the effect that insects appeared to do little good. Only one, a grower near McMunn on the Greater Winnipeg Water District Railway, some 75 miles south east of Winnipeg, said he was sure the presence of a large number of wild bees aided seed setting. Brand and Westgate(5) stated that in some districts insects such as bumble bees, and leaf cutter bees helped to bring about pollination. It is doubtful if these insects are in sufficient numbers throughout the alfalfa seed growing districts of Manitoba to trip flowers and induce an appreciable amount of seed setting. However, they may bring about cross pollination of flowers already tripped at the time of their visits. Since cross pollination tends to increase the setting of seed the wild and honey bees in this respect are useful.

CONCLUSIONS - Investigations into the nature of the alfalfa blossom and the reasons for its setting or non-setting of seed have been conducted in the North American continent for at least 106 years. The late C.V. Piper and his co-workers (14) in the U.S.D.A. in 1914 summarized all investigational work on this subject up to that time. They mentioned that the information obtained by pioneer workers with regard to structure, mechanism, pollination and fertilization of alfalfa was of such a conflicting nature that further research was necessary in order that more light may be obtained on a subject which is somewhat obscure and not easy to elucidate.

The many workers between 1914 and 1938, both in Canada and the United States, have introduced new and valuable findings, but similar to the position in 1914 many questions remain far from elucidation and there appears little more hope today of providing the farmer with a variety of alfalfa which can be depended upon to produce an average seed crop year by year under varying environmental conditions.

Because of the apparent nature of the problem, i.e. that of successful fertilization, the onus for producing a dependable seed setting strain is on the shoulders of the plant breeder. As early as 1911 Southworth(16) decided this was the most effective avenue of approach to the solution of the problem. Since tripping of flowers had been shown by most workers to have a positive correlation with seed setting, hybridizing to obtain floral parts which permitted ease of tripping represented a seventeen year project under Prof. Southworth's direction. His summary in 1928 indicates the difficulty of such work and the many factors which prevented attaining even in that period of time the ultimate goal. At the close of his work

in Manitoba he still, however, had faith that hybridization could eventually be utilized to obtain a strain of alfalfa which to a high degree would trip spontaneously as soon as the proper floral stage had been reached.

That a selection of alfalfa and eventually a distinct variety may become a possibility which possesses a high capacity for seed setting, without tripping, is the belief held by Dean L.E.Kirk of Saskatoon. Between 1930 and 1932 Kirk and White (12) isolated several autogamous plants from a selection of Grimm alfalfa designated Sask.No.666. These plants were found to produce a full quota of seed under greenhouse conditions. Pollination took place in the early bud stage and fertilization did not require that the flowers be tripped. At that time Kirk expressed the belief that such selected autogamous individual plants should provide valuable material on which to base a program of breeding for seed production.

In so far as the writer can gather, that is essentially where the plant breeder stands in 1938. The work of selecting and re-selecting of plants at Saskatoon, with its many attendant difficulties, to purify a high seed producing line goes on. Similar work is being done on the Uintah Basin Alfalfa Seed Experimental Farm, State Agric. Exp. Sta.Logan, Utah, and undoubtedly on numerous other research stations unknown to the writer.

In recent correspondence Dean Kirk points out that at the present time he does not know of anyone who is specifically studying the whole question of alfalfa seed production in a large way and he had lately discussed the desirability of instituting a comprehensive investigation with Dr. Stevenson who was recently appointed Dominion Agrostologist. He concludes, "I think this is highly advisable because it is perfectly apparent that the alfalfa seed growing industry is destined to become a pretty big thing in our provinces in the near future."

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RAINFALL IN RELATION TO YIELD AT FOUR DIFFERENT POINTS IN MANITOBA, SASKATCHEWAN AND ONTARIO.

With Mr. Brown's paper was a two-color four-piece chart, impracticable of reproduction except at considerable expense, which showed, on separate bases, the rainfall between June 15th and September 15th in 1937 and 1938 at Emo, Ontario, Gunton, Manitoba, Swan River, Manitoba, and Etomami, Saskatchewan.

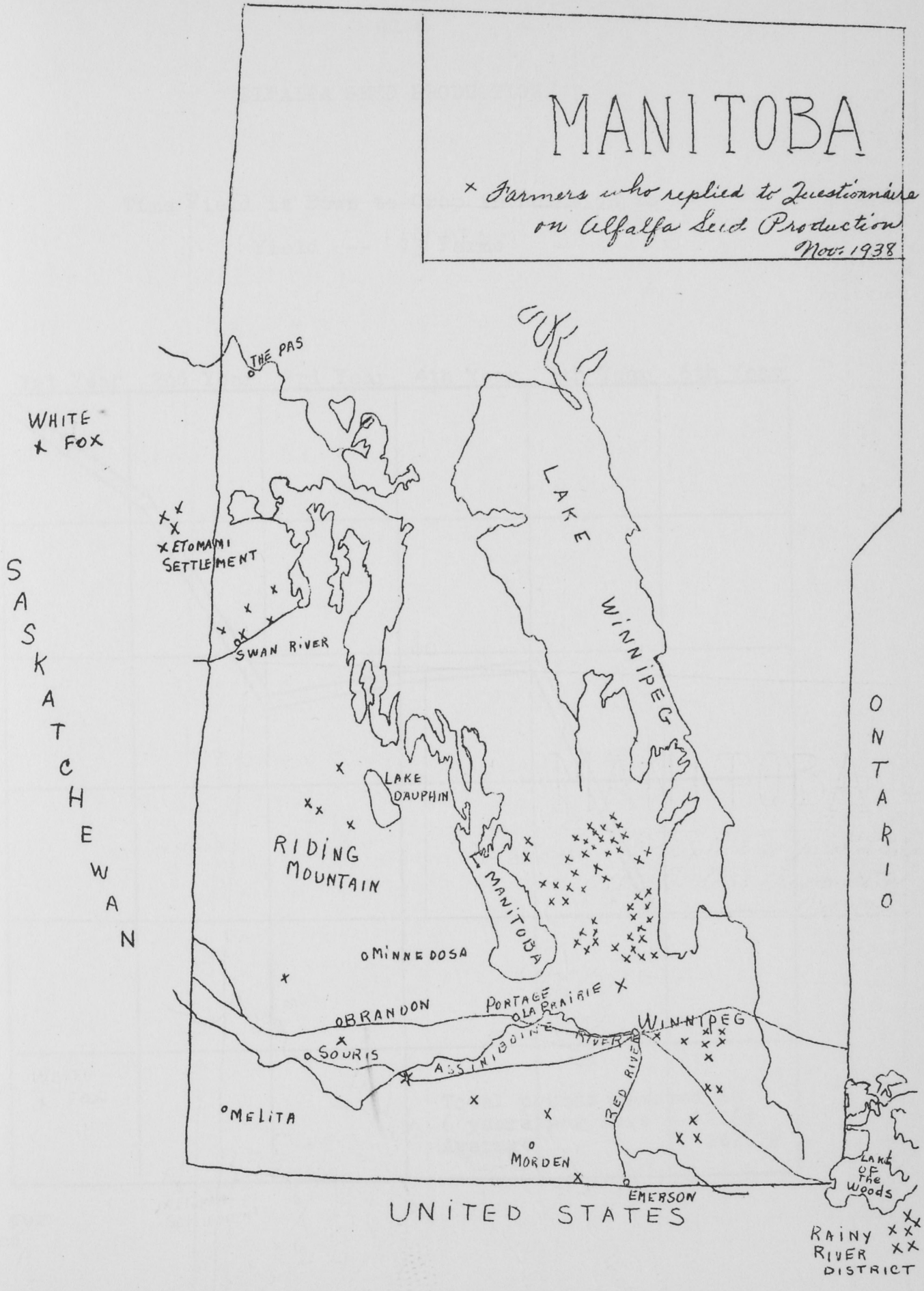
The total rainfall in the period was as follows:

Place	June		July		August		September	
	1937 inches	1938 inches	1937 inches	1938 inches	1937 inches	1938 inches	1937 inches	1938 inches
Emo	1.80	1.10	2.26	4.57	2.85	1.60	nil	.20
Gunton	4.27	3.20	1.85	2.54	4.74	1.30	nil	nil
Swan River	.90	1.41	3.45	3.90	1.89	1.30	.12	.50
Etomami	1.59	1.88	.59	5.59	1.46	3.47	.30	.65

The chart showed the distribution of showers from day to day.

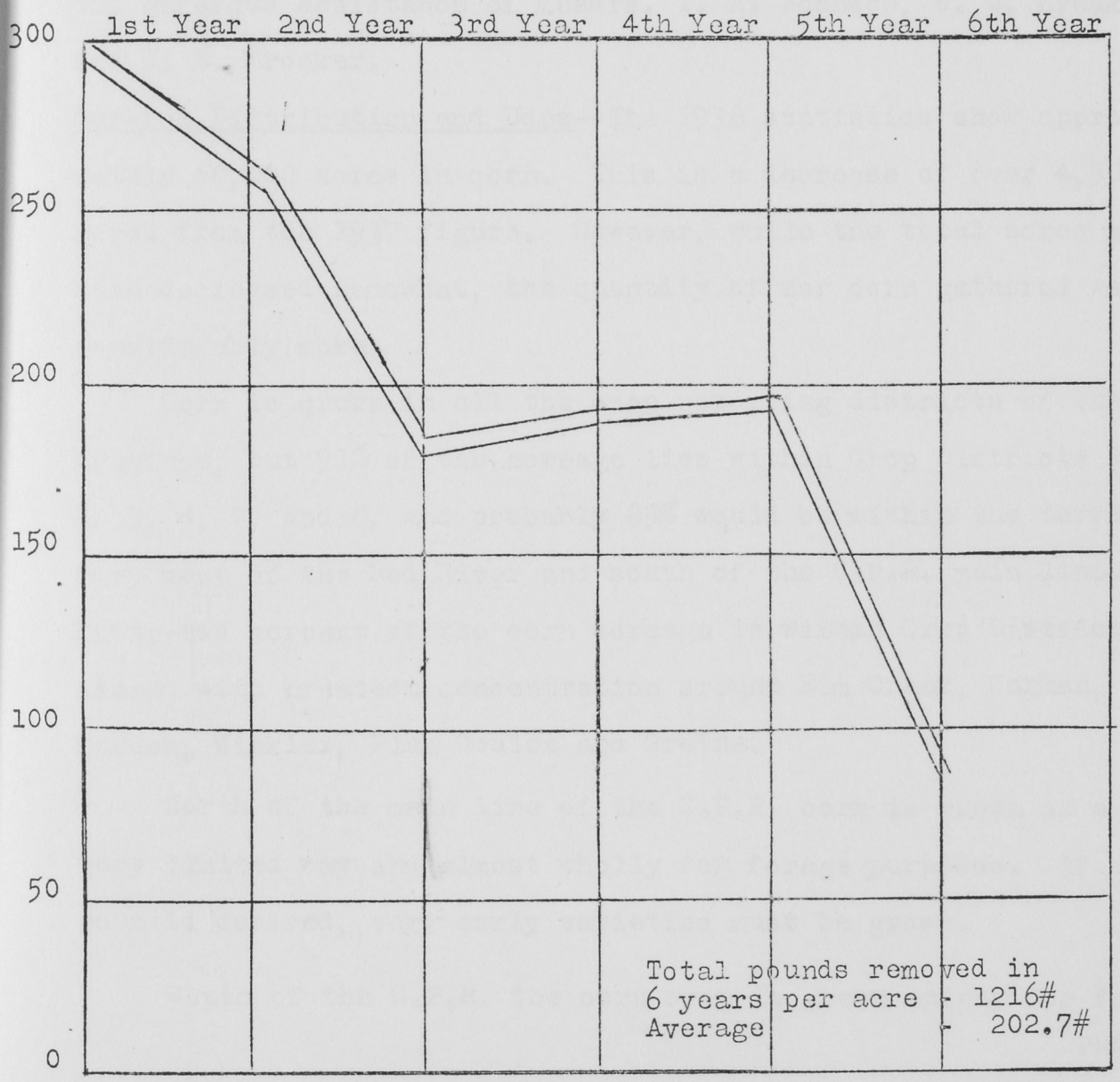
On the chart were these data:

Place	Average Yield per Acre. 1937	1938
Emo	317 lbs.	65 lbs.
Gunton	210 "	110 "
Swan River	225 "	315 "
Etomami	600 "	420 "


MANITOBA
× Farmers who replied to Questionnaire on Alfalfa Seed Production Nov. 1938
THE PAS
WHITE FOX
ETOMAMI SETTLEMENT
SWAN RIVER
SASKATCHEWAN
LAKE WINNIPEG
ONTARIO
LAKE DAUPHIN
RIDING MOUNTAIN
LAKE MANITOBA
MINNEDOSA
BRANDON
PORTAGE LA PRAIRIE
WINNIPEG
SOURIS
ASSINIBOINE RIVER
RED RIVER
MELITA
MORDEN
EMERSON
UNITED STATES
LAKE OF THE WOODS
RAINY RIVER DISTRICT

ALFALFA SEED PRODUCTION

Time Field is Down to Crop in Relation to Yield -- 13 Farms



1938 Annual Conference Manitoba Agronomists

CORN PRODUCTION IN MANITOBA

by G.F.H. Buckley. — Brandon

Because of the marked stimulation in corn production in certain areas in Manitoba during the past few years, the Forage Crops Committee has attempted to make a brief survey of the situation, placing particular emphasis upon the seed and grain production. In this report I wish to acknowledge particularly the generous assistance of Messrs. T. A. Johnson, W. J. Breakey, and W. E. Kroeker.

General Distribution and Uses--The 1938 statistics show approximately 60,000 acres in corn. This is a decrease of over 4,500 acres from the 1937 figure. However, while the total acres may have decreased somewhat, the quantity of ear corn gathered was considerably more.

Corn is grown in all the crop reporting districts of the Province, but 91% of the acreage lies within Crop Districts 1, 2, 3, 4, 7, and 8, and probably 85% would be within the territory west of the Red River and south of the C.P.R. main line. Fifty-two percent of the corn acreage is within Crop District 3 alone; with greatest concentration around Elm Creek, Carman, Morden, Winkler, Plum Coulee and Gretna.

North of the main line of the C.P.R. corn is grown in a very limited way and almost wholly for forage purposes. If ear corn is desired, very early varieties must be grown.

South of the C.P.R. the corn crop is grown mainly for forage purposes;

however, more and more ear corn is being saved each year until now it has reached quite large proportions.

Ensilage is recognized as the best form in which corn can be stored for winter feed. The upright silo, however, is rather expensive to build, and this feature has deterred many from growing corn. The trench silo is cheaper to construct, and is more popular. During the past few years the snow-fence silo has been used to quite an extent. Another method that is becoming quite common in the denser corn areas is to cut the corn and blow it into piles. These are later covered with 6 to 8 feet of straw. The silage from these piles appears to be quite satisfactory. Even in the heart of the corn area a considerable amount of corn is dried and fed in sheaf form.

The production of ear corn is still a secondary consideration. In the Carman area, with the exception of a very few farmers, seed is saved only when conditions are favorable. Throughout the municipalities of Stanley and Rhineland, more farmers are interested in the production of ear corn, both for seed and feed. In the southwest, the production of seed corn is being stimulated through the activities of the P.F.R.A.

EAR CORN PRODUCTION

CARMAN AREA--(Information supplied by T.A.Johnson)--It is impossible to give accurate data with respect to acreage and yield in this district. Practically every farmer grows some corn, the acreage ranging from four to one hundred acres. The average would be somewhere around fifteen or twenty acres, but only a small percentage is harvested as grain.

Yields vary considerably, due mainly to the amount or lack of cultivation of the growing crop. Farmers are beginning to realize that corn will not fight weeds, and if they are to get a profitable crop they must plant their corn on reasonably clean land and harrow and cultivate enough to keep the weeds in check. The varieties generally grown are Falconer, Minnesota #13, N.W.Dent and Gehu, with Minnesota #13 perhaps the most popular. For the past eight or ten years there has been little or no difficulty in maturing seed of any of these varieties. The biggest trouble some years has been to dry large quantities, but with the artificial driers used now, drying has ceased to be a serious problem. The yields range from 50 to 30 bushels of shelled corn per acre.

Mr. J. Strachan has the only drier in the Carman district, built especially for the drying of corn. This drier has three bins with a total capacity of 150 bushels of ear corn. For seed, the temperature of the air blast is kept below 115°F, but for feed corn the temperature can be raised much higher without doing any harm. In 1937 Mr. Strachan dried 800 bushels and in 1938 some 1150 bushels.

Mr. M. Parks, who operates a commercial hatchery in Carman, also does drying. He places the corn, usually shelled, in the trays in the incubators and heat is supplied in the usual way. Suction fans draw off the moisture. He dried some 500 bushels in 1937 and about the same this year.

MUNICIPALITIES OF STANLEY AND RHINELAND--(Information supplied by W.J. Breakey and W.E.Kroeker)--The acreage devoted to the production of corn in the municipalities of Stanley and Rhineland was increased this year over that of 1937. The market outlets secured in the previous season gave the farmers some assurance of a steady demand for their product in the future. This season there was a stronger competition of buyers than heretofore, which indicates a healthy trade condition. With the larger number of outlets, the estimation of total production becomes more difficult than previously. However, from available information from various sources, it seems that the production of ear corn only in these two municipalities is in the vicinity of 250,000 bushels at least. The average yield in the Winkler district was around 25 to 35 bushels per acre, 5 bushels per acre less than last year and about 5 bushels higher than the average of the past 6 years.

The method of drying corn for seed employed by most farmers is to put a layer of ear corn in the attic of the house. Most homes in this area are one-storey frame structures, and sufficient heat gets through the ceiling to dry a limited quantity of ear corn. The moisture content of the corn when stored, climatic conditions and ventilation, etc., have such an influence on the germinative quality of the seed, however, that its suitability for the trade cannot be stated with certainty until a moisture and germination test is made of a truly representative sample in January or February.

There are at present three commercial driers in the area.
1. W.F.Enns, Winkler - 175 bus. daily; 3500 seasonal,(feed).
2. G.Elias, Haskett - 500 bus. daily; 1000 bu. seed; 700 bu. feed.
3. A.A.Kroeker & Sons -325 bus. daily; 8000 bu.(seed and feed).

Of the total amount of ear corn produced, only a small fraction will be used on the farms for feeding. The market price of corn is somewhat higher than that of other feed grains, and most producers have already marketed their corn and purchased whatever other feeds were necessary. Shelled corn especially is seldom used locally for feeding, most corn that is used being fed on the cob.

This year there have been so many buyers on the market with no means of really getting at the amount purchased by each, that there is room for a large discrepancy in estimates. A few of the holdings known at present are:

McCabe,	Plum Coulee and Gretna	100,000 bus.
	Morden	5,000 "
Federal,	Plum Coulee	8,000 "
	Winkler	5,000 "
Hutterites,	Plum Coulee	4,000 "
Sirluck,	Winkler	4,500 "
Kroeker,	Winkler	10,000 "
		136,500

A considerable quantity of corn has been marketed in Winnipeg, being trucked there by the farmer himself or some trucking agent. Truck drivers from Gretna, Plum Coulee and Winkler have been doing a flourishing business in corn for several weeks.

The increasing use of specialized corn machinery is a good indication of the permanence of an industry which was formerly considered to be but

temporarily popular. There are now 5 large mechanical corn pickers in the district, and two ensilage combines. High capacity cylinder shellers are being used by many farmers; in fact the demand has become so great that a Morden firm has engaged in the regular manufacture. The more widespread useof Farmall type tractors with corn cultivation equipment indicates the intention of farmers to devote larger acreages to this crop, and shows the confidence of the growers in the permanence of corn growing.

The organization last year of the Southern Manitoba Corn Growers' Association has done much to stabilize prices and broaden the market for Manitoba grown seed corn. Hopes are entertained for further progress in the popularizing of the home product, and present indications point toward their full realization. With the current season's total supply of Manitoba seed estimated at 11,000 bushels, the amount of southern seed that will have to be imported will be less than formerly, and the losses due to planting of unsuitable seed corn decreased.

Last year the Association handled about 4,700 bushels of seed corn and indications are that there will be a larger amount handled this year.

THE SOUTHWEST--While a certain amount of corn has been grown for a number of years in the southwest, its production for seed purposes has received considerable stimulation through the activities of the P.F.R.A.

Each year approximately 260 parcels of corn, sufficient to sow about 3 acres, is distributed among the members of the several Agricultural Improvement Associations. This seed is distributed for the purpose of stimulating an interest in the production of ear corn for seed and feed. According to the Provincial statistics, there were approximately 8,500 acres of corn in two Crop Reporting Districts, Nos.1. and 2. Of this acreage at least 25 per cent was grown from seed supplied through the P.F.R.A., during the past two years. The varieties distributed in 1937 were Falconer, N.W.Dent, Minnesota #13, and Gehu, while in 1938 only N.W. Dent and Falconer were sent out, most of it being N.W.Dent. It is impossible to estimate the proportion of the crop saved for seed. Most farmers gathered just sufficient ears to supply their own seed requirement. A few saved extra ears for feed purposes.

In the main, the ears were dried outside in wagon boxes, crates and small cribs. Three shellers were sent around throughout the Associations, the growers bringing their corn to central points. So far about 3,000 bushels have been shelled, 1,280 bushels being saved in the Lyleton Association alone. As the shellers are still at work (Nov.26) complete figures are not available. The 3,000 bushels so far shelled was saved by 56 growers. Some saved only one bushel, while the greatest amount for any one grower was 220 bushels.

Weeds Committee

EXPERIMENTS WITH LEAFY SPURGE AT THE BRANDON EXPERIMENTAL FARM

by G.F.H. Buckley.

In the spring of 1937, a piece of land, approximately 4½ acres, and covered with a solid stand of Leafy Spurge, was chosen as the experimental area. A progress report of the work done in 1937 was prepared and submitted last winter. This report gives a summary of the findings to date, but because of the need for briefness, details must be eliminated.

Cultural Tests--In the cultural experiments, five points received particular attention, namely -

1. Time of breaking,
2. Depth of breaking,
3. Method of breaking,
4. Method of cultivation,
5. Number of cultivations.

Work was started on May 25, 1937, and throughout that season most of the plots were kept black through various methods of cultivation. By November the worked soil in most plots was practically free of living root pieces. However, below the worked level the old roots were quite vigorous. A careful examination of each plot was made on April 25, 1938. With the exception of those plots that had been broken the previous August and September, little or no growth was found arising from the cut root pieces in the top soil. But in all cases there was growth from the main roots below the working depth. This growth was sufficiently vigorous to show that it could not be controlled by a cropping system and that further cultivations were necessary. The first cultivation of the second season was given on May 5 and the treatments continued at intervals until Oct.11.

General Conclusions:

1. Land that is badly infested with Leafy Spurge requires two seasons of thorough summerfallowing before it can be cropped with any degree of success.

2. Breaking Leafy Spurge land in May or June is preferable to later breaking. It permits more cultivations and a longer period for starving the roots.

3. Breaking with the plough is more satisfactory than breaking with the one-way disc or stiff-tooth cultivator. The plough cuts the roots better and at a lower depth than the other implements.

4. Cultivations should be frequent enough to keep the Leafy Spurge from appearing above ground. At first the cultivations will need to be about 7 to 10 days apart. Later, as the roots become weakened and growth is less rapid, the interval between the cultivations may be extended.

5. Both the cultivator and one-way disc will give good results provided the surface is kept bare. The one-way disc has less penetration than the cultivator, so the old roots are closer to the surface and new growth has a shorter distance to go to reach the surface. Therefore more treatments are required with the one-way disc. Also the surface soil becomes very fine and dusty, and is more subject to blowing than the cultivated land.

Chemical Tests--In the main, the chemical tests were confined to a study of the efficiency of Atlacide. Major consideration was given to:

1. Number of applications necessary for control.
2. Concentration of solutions used as sprays.
3. Methods of applying Atlacide.
4. The quantity of Chemical used as compared with the concentration.

Treatments were started in 1937 but on some of the plots it was found necessary to give further treatments in 1938 to obtain a complete killing.

General Summary:

1. When a 10 percent solution of Atlacide was sprayed at the rate of one gallon per 100 square feet, it required three or four sprayings to make a complete killing of the Leafy Spurge.

2. If a 15 per cent or 20 per cent solution was used at the rate of one gallon per 100 square feet, a second spraying was necessary to make a complete killing.

3. Applying Atlacide in the form of dust did not give as satisfactory results as in the liquid form, due largely to the ease of applying and the more even distribution of the latter.

4. Applying the spray to the foliage and stems of the Leafy Spurge killed the top growth and stopped budding at the crown sooner than when the spray was applied directly to the ground. However, the ultimate result was the same for both methods.

5. A double quantity of a half-strength solution was as effective as a single quantity of a full-strength solution. It is the actual amount Of Atlacide applied that counts. The degree of dilution should be such as to facilitate even distribution of the chemical.

6. Atlacide has a sterilizing effect upon the soil, the degree of sterility being in direct proportion to the amount of chemical applied.

WEEDS-NORTH AND SOUTH OF THE INTERNATIONAL BOUNDARY.

By W.S.Frazer, Agricultural Representative,
Morden.

Weeds play a very important part in cereal production whether it be in North Dakota, Manitoba, or in any other part of the world; and it is only natural that we should be interested in the problem in North Dakota because there is no reason, other than the fact that there is not a great exchange of seed, why weeds should not spread from the United States to Manitoba as easily as from Manitoba to Saskatchewan.

Weeds of North Dakota - Prof.O.A.Stevens, of the North Dakota Agricultural College, Fargo, Mr. C.R.Montgomery and Mr. P.E.R.Abrahamson, County Agents at Cavalier and Langdon, have supplied the writer with the information in regard to the North Dakota weed problem. All three consider Field Bindweed, Leafy Spurge, Hoary Cress and Russian Knapweed of major importance with the old standbys, Sow Thistle, Couch Grass, etc., also causing considerable loss. A new weed, Austrian Field Cress, has been reported in the State, but little is known of it at the present time.

LEAFY SPURGE--Leafy Spurge has, perhaps, been given more attention in North Dakota in recent years than any other weed. All authorities are agreed that it is a very persistant weed for which, unless controlled while in small patches, eradication is extremely difficult. Considerable work has been done with chemicals in the State, particularly in Pembina County, and Mr. Montgomery, County Agent, Cavalier, has supplied the following information:

The County purchased a machine, consisting of a 500 gallon wood water tank, a 1½ horsepower engine and a power sprayer capable of spraying under a pressure of 300 pounds. This was mounted on a truck. The work is done under the direction of the township supervisor who is expected to locate the plots and assist in the spraying. Two men are required to run the sprayer. They use a solution of sodium chlorate at the rate of one pound to one gallon of water and apply liberally under 300 pounds pressure. They find that they can get a 60 to 70% kill with one application and a second and even a third application is necessary to get a 100% kill. The spraying machine is started the last part of June , and the second application is given about September 1st. The spray method has been used mostly on Leafy Spurge, but has proven to be also very effective in controlling Field Bindweed (or Creeping Jenny as it is called in the States) and also on Austrian Field Cress. They find that sodium chlorate is less expensive than Atlacide, although the fire hazard is greater.

The September 1938 issue of the Bimonthly bulletin issued by the North Dakota Experimental Station, carries an abstract of an article in Science (88:57-1938) on the "Control of Leafy Spurge by Sheep Grazing". In brief, the facts showed that four ewes and five lambs were placed on July 2nd in each of two one-acre plots of Leafy Spurge and one plot was mown, the other not. By August 12th, the sheep in the mown plot had to be removed owing to lack of forage and the other lot were allowed range of both plots. On September 24th they were removed with practically no sign of new growth evident and all the Spurge stalks stripped of leaves and seeds. The ewes lost an average of 17.5 pounds, the lambs gained 26.5 pounds against a check of a gain by the ewes of .25 pounds and the lambs 26.25 pounds. No record is given of the ultimate result of the Spurge plot, but it would seem that sheep grazing may have some possibilities, particularly as a means of thinning it out so that it may be eradicated by other means.

FIELD BINDWEED--Field Bindweed or Creeping Jenny ranks amongst the most troublesome weeds in North Dakota and two years of summerfallowing will not control it. In 1919 attention was called to the fact that it was well established in the southern counties and might become a serious problem unless controlled, but the warning was not heeded and by 1935 it covered in Ward county alone over 300 acres in one township, and many other counties are nearly as bad.

Summerfallow, smother crops, pasturing with sheep and chemical spraying are recommended for control, depending on circumstances.

RUSSIAN KNAPWEED-Russian Knapweed is also a very persistant perennial which is gaining a foothold in the state. It makes a dense growth and occupies the ground completely. Control measures recommended are summerfallow, sodium chlorate spraying, or in the case of very small plots, common salt.

Reports from Colorado indicate that they have been using Carbon Bisulphide in holes 18 inches deep and two feet apart. Two ounces of the material is poured into each hole, which is then filled with soil and packed. This produces a heavy poisonous gas which kills the plant but does not injure the soil.

DOG MUSTARD-Dog Mustard is an annual which is widely distributed in North Dakota and which grows rapidly after the grain is cut. After-harvest cultivation is recommended.

HOARY CRESS-Hoary Cress is a perennial which spreads by roots and is becoming established and is considered to be a serious weed. Spraying is found to be unsatisfactory and intensive cultivation is recommended.

AUSTRIAN FIELD CRESS-Austrian Field Cress has been found in three or four places in the state, one of which is the south-west of Pembina county. Spraying seems to be quite effective.

WEEDS IN SOUTHERN MANITOBA

In so far as the area along the Manitoba side of the International boundary is concerned, Leafy Spurge and Field Bindweed seem to be the most serious aside from the old timers which continue to flourish, and of which Wild Mustard, Russian Thistle, Quack Grass and in 1938, Wild Buckwheat, are causing the most trouble. Sow Thistle is trying to stage a comeback after the grasshoppers, but the introduction of the one-way disk should provide a means of control.

LEAFY SPURGE-Leafy Spurge is of major importance in the municipality of Stanley, quite common in Rhineland and cropping up in Pembina. It has also put in its appearance further west.

Control measures have not been very effective. Two-year summerfallow is impractical owing to light soil and even a strip farming experiment resulted finally in the top soil blowing away down to the furrow bottom. Chemical treatment is too expensive except for small patches. Two hand sprayings of Atlacide in June and September have not been 100% effective. Prevention of seed setting by mowing has retarded the spread where the weed occurred in pasture land.

FIELD BINDWEED-Field Bindweed is gradually gaining ground, and where Field Bindweed and Leafy Spurge are growing together, the former will win out. Intensive cultivation even in corn fields has not been effective. Spraying of small patches seems the only way of checking its spread.

DOG MUSTARD-Dog Mustard is an annual which seems to be doing well at Emerson and Killarney and has established itself at Ochre River and St. Rose du Lac. It promises to become one of our most troublesome mustards. Control measures would seem to be, early and thick seeding to provide shade, followed by harvest cultivation.

JUNE WEED-June Weed (Ellisia Nyctelea) a low spreading annual with bell shaped bluish-white flowers which reaches maturity in two months, causes trouble north of Darlingford by crowding the crop out during June.

CONCLUSION-It is obvious from a study of what is happening across the line and in Southern Manitoba that we now have in this province some newer weeds which, unless eradicated before they become firmly established, promise to surpass anything which we have at the present time.

Leafy Spurge Infestation in Manitoba-(Incomplete Record)

as Reported by Municipal Weed Inspectors in 1938.

Note--Where different reports appear from the same municipality each line summarizes the report of a separate inspector; each line relates to new area.

RED RIVER VALLEY and EASTWARD:

Municipality	Number of Farms	Approximate Acres
Assiniboine	One patch known to Weeds Commissioner.	Fraction
Dufferin	Report several farms(up to 25 acres on a section-number of sections named, possibly a dozen).	
Grey		Very little
Grey		One patch
Hanover	Several farms known. 1938 reports not available.	
North Kildonan		Perhaps ¼ acre.
Portage la Prairie	One.	One
Portage la Prairie		One patch.
Rhineland	4	4
Rhineland	Several One owner summerfallowing 3	About 70.
Rhineland	9 years in succession. In Altona.	5.
Rhineland	5	Less than 1.
Rhineland		One patch.
Roland	Three farms pretty bad.	Hard to say.
Stanley	16 farms	1,800
Stanley	25 "	300
Thompson	3	200
West St.Paul		On two plots.

SOUTH OF C.P.R. MAIN LINE but WEST OF RED RIVER VALLEY:

Albert	4	5
Argyle	One outbreak - small	
Cameron	Small plots-2 farms and road	
Cornwallis	About 8.	About 350.
Edward	1.	¾
Glenwood	1. Mr.---had plowed his land for summerfallow and cultivated it five times, using the rod weeder once on about 20 acres. Had a very fine crop of wheat. Spurge did not show up.	
Lorne	Small plots on two farms.	
Louise	2 farms-scattered in patches over 150 to 160 acres;	If close, 10 or 15.

Municipality	Number of Farms	Approximate Acres
Morton	One patch.	
Oakland	About 3½ SECTIONS on 5 farms. Badly infested farms are abandoned.	Some hundreds.
Pembina	3.	2 or 3.
Riverside	One patch.	
Roblin	2 farms. Scattered over 50 acres.	50-scattered.
Sifton	2 farms have several small patches.	
South Cypress	Many.	Close to 100.
South Norfolk	2	¼ acre.
Strathcona	1 farm and roadside.	2.
Strathcona	1 farm.	
Turtle Mountain	30 acres more or less. About 11 farms.	30.
Victoria	6 to 8 farms.	300 to 400.
Wallace	½ section north of Hargrave pretty bad.	10 or 12.
Whitehead	To be found on every ward in this municipality. Acreage hard to estimate. Increasing.	
Winchester	1.	About 1/20 acre.
BETWEEN C.P.R. MAIN LINE and RIDING MOUNTAIN-WEST OF PORTAGE LA PRAIRIE.		
Blanshard	1 farm.	
Daly	7 farms	25.
Ellice	3 farms.	15 to 20.
Elton	4 farms. Scattered over perhaps 1000 acres.	Scattered.
Hamiota	2 farms.	10
Hamiota	1 farm and road allowance	¼
Langford	2	20 or 30.
Lansdowne	Few patches.	
Lansdowne	2 farms.	1/8.
North Cypress	11 farms, possibly 30 or 40 acres. Sheep have thinned it somewhat.	30 or 40.
North Norfolk	2 farms. Not thick. Scattered	10
North Norfolk	3 farms. Declining somewhat.	½
Rossburn	About 6 farms.	About 4.
Russell	Small patches. 1 farm.	
Strathclair	1 farm.	1
Westbourne	9 farms. Scattered. Pasturing with sheep keeping it down.	About 100 thinly.
Woodnorth	2 farms.	10

No authenticated reports of Outbreaks in the Interlake Area or North of the Riding Mountain.

METHODS OF WEED CONTROL ON MANITOBA ILLUSTRATION STATIONS.

By D.A.Brown, Brandon.

There is abundant evidence from field crop experiments on Illustration Farms to prove that weeds commonly infesting Manitoba agricultural lands are more effectively kept under control by the practising of mixed farming rotations than by straight grain growing. When Illustration Stations were established in 1924, grain rotations were practised on practically all farms. In 1938 only one operator continued a "grain, fallow" system on his land apart from station plots. This farmer has, however, approved of plans to bring half of his farm into a six-year mixed farming rotation in 1939. While the trend towards cropping systems that include hay and pasture has been brought about, due to other motives, as well as the desire to control weeds, it is true that the majority of station operators have been impressed with the progress made in connection with the reduction of weeds on station fields where mixed farm rotations are in use.

During the early years of station work the main project was weed control. In 1938 most stations have become sufficiently free from weeds that the problem is now one of secondary consideration to that of bringing field crops into a system that will support to better advantage a balanced system of farming.

After fourteen years of station work, the following deductions relative to weed control can be given:-

1. Methods of control vary in relation to soil and climatic conditions. Perennial weeds are less prevalent on the drier lands and in the drier areas. Under dry conditions most weeds are easier to keep in check. On lighter textured soils control is more readily accomplished with less labor than on heavy soils.

2. Intensive tillage methods for weed control such as practised on bare fallows or between grain crops, while immediately effective, have little lasting value as long as a straight grain rotation is followed.

3. Mixed farming rotations distribute the necessary work on the land to better advantage than do grain systems. This provides more time and often the best possible opportunity for fighting weeds.

4. While introducing grass and legumes into a field cropping management helps to control weeds, it is now evident that, to be fully effective, fields must remain in sod for some years. This necessity has brought about the use of an eight-year rotation on several Illustration Stations in which pasture for one or two years plays an important part. It is pointed out that the pasture year in Manitoba cropping systems is gaining recognition as being part of a good farm management plan. On

northern Stations, where weeds are inclined to be more troublesome than in the south, a longer sequence of crops in a systematic plan is necessary than in the drier southern districts.

5. Mixed farming rotations on the stations and also on the Brandon Experimental Farm have obviously controlled perennial weeds and wild oats much better than grain rotations. Such annuals as pigweed, stinkweed, peppergrass, Russian thistle and mustard have not been as effectively controlled as perennials; although by the use of hay and pasture they are kept in check better than by continuous grain. Annuals are more spasmodic in their attack than perennials. The best field crop system will not prevent invasions of Russian thistle and other tumbleweeds, pig-weeds, mustard and stinkweed; nor will it readily remove these once their long lived seeds get into the soil; but a good cropping plan will at least give the farmer a better fighting chance.

Weed counts are made annually at Brandon on specially designated areas over the land occupied by four different crop rotations. Seven years averages give the following values, these values running on a scale from zero to five: o - no weeds; 5 - heavy infestation.

Rotation	Rating
D. Straight Grain and Fallow; manure for one grain crop.	3.0
E. Straight Grains and Fallow.	2.8
G. Mixed - grain, hay and corn.	2.3
H. Mixed - grain, hay and fallow.	1.8

These four rotations have been continued for many years on their present location. The weeds in D. and E. are mainly Sow Thistle, Canada Thistle and Wild Oats with the latter the most prevalent. In G. and H. practically no perennials and Wild Oats are found. Weeds in these areas are such annuals as Pigweed, Stinkweed, and Russian Thistle.

Note: See table on next two pages.

CROP ROTATIONS ON ILLUSTRATION STATIONS IN RELATION TO WEED CONTROL.

Station	Year	Rotations	Prevalence of Weeds		Comparisons of effectiveness of different rotations.
			When Started	1938	
Arborg	1926	6 year:-Fallow,grain hay,hay,grain,grain.	Wild oats,stinkweed and sowthistle all very bad.	Stinkweed still bad, others greatly reduced.	Grain rotations in this locality have little fighting chance against weeds.
Dugald	1924	3 year:-Corn,grain,clover 6 year:-Fallow,grain hay hay,grain grain. 8 year:-Fallow,grain, grain,hay,pasture, breaking,grain,grain.	Wild oats,sow-thistle and stink-weed very bad.	Fields clean except for odd patch of stinkweed and wild oats	The eight-year rotation is proving most effective. These rotations have reduced perennial weeds much more thoroughly than grain rotations.
Eriksdale	1926	3 year:-Fallow,grain, clover. 4 year:-Fallow,grain, cl over,grain	Sowthistle very bad.	Some sowthistle, no other weeds.	Grain rotation was discontinued at this station in 1933 because of inability to fight sow-thistle.
Gilbert Plains	1926	5 year;Fallow,grain,Hay grain,grain. 8 year:Fallow,grain,hay, grain,hay,pasture, breaking,grain,grain.	Wild Oats,sowthistle and quack grass all very bad.	Couch & Sowthistle have almost dis-appeared,some wild oats remain.	The five-year rotation while an improvement over three grain crops and fallow did not give as good results as expected.The 8-year rotation has nowreplaced all other systems on this farm.
Gunton	1924	3 year:Clover,hay,grain grain. 6 year:Fallow,Grain,Hay, hay,grain, grain.	Grain crops had frequently to be cut green because of sow-thistle during the early years of this station.	Weeds are no longer a problem on the rotation fields.	There is much more sowthistle on the operator's grain rotation fields than on the station fields. Other weeds are about the same.
Katrime	1928	6 year:Fallow,grain,hay, ha y,grain,grain.	Wild buckwheat bad, few other weeds.	Weed situation about same,some Russian thistle now.None when started.	Sowthistle prevalent on grain rotations in district-have never bothered in 6 year rotation.
Peters-field	1925	3 year:Clover,grain,corn 6 year:Fallow,grain,hay, hay,grain,grain. 8 year:Fallow,grain,hay, hay,grain,grain.	.Heavy infestation of wild oats,Canada thistle,sowthistle and stinkweed.	First 2 years wholegrain crop was cut for hay because of weeds.Area now free of all except few wild oats & some stinkweed.	Only grain rotation effective against weeds here was alternate grain & fallow.Mixed farm rotations including pasture,giving very good results.
Plumas	1924	3 year:Corn,grain,clover 6 year:Fallow,grain, hay,hay,grain,grain.	.Sowthistle very bad. Some wild oats.	Sowthistle & wild oats are thing of past on this station,but Russian thistle has appeared.	Grain rotations are not practised any more this farm.Hay & pasture have been introduced by operator as essential to maintain fertility & keep weeds in check.
Roblin	1926	3 year:Grain,grain, clover. 4 year:Fallow,grain, clover hay,grain	Stinkweed,Canada Thistle,sowthistle and wild oats very bad.	Canada thistle & stinkweed still bad.Wild oats & sowthistle much reduced.	The 3 yr. rotation is similar to a grain system & it has not proved effective against weeds. The 4-yr.plan given best results & now practised exclusively on operator's farm.

Station	Year	Rotations	Prevalence of Weeds When Started	Prevalence of Weeds 1938	Comparisons of effectiveness of different rotations.
St. Rose	1926	3 year:grain,grain, clover. 4 year:fallow,grain, clover. hay, and grain.	Sowthistle extremely bad. Few wild oats.	No wild oats, sowthistle not now a big problem. Dog mustard has been introduced and gives trouble.	The three-year rotation does not keep sowthistle in check. Two crops of grain in succession are not possible in this district if weeds are to be controlled. The four-year rotation has proved best.
Swan River	1930	6 year:Fallow,grain, hay,hay,grain, grain. 8 year:Fallow,grain, grain,hay,pasture, breaking, grain, grain.	Wild oats,sow and Canada thistle bad in patches, but weeds not a big problem.	The weed situation has not improved on this Station.	In 1936 a change was made from the 6 to the 8 year rotation in an attempt to more effectively control weeds. Pasturing is considered essential toward this end, with a whole year to break up. In Swan River Valley grain rotations are out of the question if weeds are to be kept under control.

Grain Grading Committee

THE EFFECT OF VARIOUS FORMS OF DAMAGE ON THE MILLING AND BAKING QUALITY OF WHEAT

By T. R. Aitken,
Board of Grain Commissioners Grain Research Laboratory.

Wheats which differ in appearance from the normal are regarded as "damaged" by the Grain Inspector and seldom, if ever, is a crop harvested in Western Canada which does not contain fairly high percentages of wheat affected by either frost, weathering, rust or drought. Aside from causing the appearance on the market of bran-frosted and severely frosted wheat, frost is indirectly responsible for the harvesting of considerable quantities of immature green wheat since in districts where early frosts are prevalent, there is a tendency on the part of the farmer to cut his grain before it is fully mature in an endeavor to escape frost damage. Weathering is the cause of the presence of both bleached and sprouted wheat while rust and drought are responsible for thin wheat of low weight per bushel.

Regardless of individual opinion as to the quality of damaged wheats, it is desired to emphasize that Canadian wheat is graded and bought very largely on appearance, and the buyer looks with disfavor on wheats which do not "look right". However, in certain years, if the average quality of a particular low grade is out of line, this will be reflected in the price, since there is today a greater tendency than formerly for buyers to consider intrinsic value. One important factor which influences the price of damaged wheat is the greater variability in the quality of different parcels of the lower than in the higher grades, and there is always an element of risk in purchasing wheats which are not normal in appearance.

Brief statements, abstracted from reports of various laboratories, regarding the effect of various forms of damage on wheat quality follow:

Frosted Wheat - The concensus of opinion is that frosted wheat has a higher intrinsic value than is reflected by grade and that bran-frost has little or no effect on either milling or baking quality. The effect of frost is largely dependent upon the stage of maturity of the wheat when the frost occurs. When the kernel is in the stiff dough stage (44% - 46% moisture content) injury to quality is not serious; wheat of this character is generally bran-frosted only. It is the attack of frost on insufficiently matured grain that is dangerous from the standpoint of quality since the kernels are both immature and severely frosted. Flour from severely frosted wheat is distinctly greyish, is generally high in water absorption, produces a dough that is short and somewhat sticky and a loaf of small volume, coarse texture and inferior crumb color. Millers are generally agreed that it is difficult to effect a maximum and complete separation of flour from bran in the instance of heavily frosted wheat since the bran is easily pulverized and tends to contaminate the flour. However, British and Canadian millers are at times quite willing to purchase frosted wheat grading No. Four Northern because the intrinsic value is generally higher than the appearance indicates. When there is an abundance of normal wheat available, frosted wheat grading Nos. Five and Six is seldom wanted except for special markets where it is a case

of "milling down to a price".

Immature Wheat (unripe) - Opinions differ as to the baking strength of immature green wheat, but there is general agreement that the resulting flour is high in gassing power and greyish in color, which color is carried through into the final loaf. Tests made with wheat cut at different stages of maturity indicate that the baking strength of even quite immature wheat is relatively high and that wheat, harvested after the dry-matter content of the kernels has reached 58%, can be considered mature. As regards milling characteristics, small scale tests conducted by the Grain Research laboratory have shown that when 10% or more of immature green wheat is present in an otherwise normal mill mixture, the flour has a tendency to be "sticky" with the result that small "balls" are formed which make bolting difficult and slow. In commercial practice, this would cause a reduction in the yield of high-grade and increase the yield of low-grade flour. The milling difficulties and the greyish color of the flour are the worst features of this type of wheat.

"Brassy" Colored Kernels - "Brassy" color in wheat is not considered to be the result of cutting while the grain is immature, but is believed to be due to an interruption in the normal ripening process which interferes with the complete disappearance of the green pigment in the branny layer. The factors causing this abnormality are not fully understood, but casual observations suggest that it may be due to low temperature during ripening or to premature ripening. Kernels of this type appear to be particularly prevalent in wheats susceptible to stem or leaf rust, and Thatcher, which is not resistant to leaf-rust, was heavily affected this year. Preliminary tests conducted by the laboratory with several samples of "brassy" colored wheats have indicated that their baking strength properties are similar to those of One Northern wheat. Insufficient work has been done to determine to what extent the milling characteristics are influenced, but tests are now under consideration to obtain more complete information regarding the general quality characteristics of wheats of this character. Samples submitted by the Botany Division of the Dominion Rust Research Laboratory have also been examined; these comprised two sowings of Thatcher (early and late) and a late sowing of Renown, portions of which were sulphur dusted to control rust. The dusted wheats were higher in grade, test weight and protein content and yielded flours of lower carotene content and higher absorption than the undusted wheats which were characterized by brassy colored kernels. Differences in baking strength between corresponding samples were not marked. As the wheats were grown under comparable conditions, they indicate that the presence of "brassy" colored kernels does not influence baking strength adversely.

Weathered Wheat - This type of wheat embraces both bleached and sprouted kernels, and while they are quite different in general quality, in certain respects they are similar since incipient sprouting generally occurs with bleaching.

(a) Bleached - Wheat which is only lightly bleached and which shows no visible signs of sprouting, is equal to normal wheat of corresponding protein content in milling and baking quality. Bleaching does not alter the protein content, and the starchy appearance so often noticed when the kernels are cut across, is due to the formation of minute air spaces within the kernel during the alternate wetting and drying and not to any conversion to starch. There is a close resemblance between the appearance of bleached and soft starchy kernels.

(b) Sprouted - If grain remains moist for several days under conditions which are conducive to sprouting, it will germinate. Shortly after the kernels become thoroughly wetted, that portion of the germ which lies next the endosperm commences to secrete active ferments which posses the property of digesting the starch and protein stored in the endosperm. As a consequence of greatly accelerated proteolytic activity, the gluten loses its elastic and tenacious properties and therefore, if germination continues for very long, the resulting flour is unfit for breadmaking. A considerable proportion of the starchy material is also "burned-up" with the result that there is a loss in bushel weight and flour yield. The baking quality of sprouted wheat depends very largely upon the original protein content of the wheat and the degree of sprouting. Provided the protein content is fairly high and the sprouting is not very far advanced, the general baking quality is not seriously impaired; when the sprouts are relatively long(length of the wheat kernel) the dough has a tendency to slacken and run. Bread made from wheat containing a large percentage of sprouted kernels is usually of large volume and coarse or open texture. In seasons when the general level of gassing power is low, the presence of a small percentage of slightly sprouted kernels in otherwise normal wheats is distinctly advantageous since high gassing power is a characteristic of sprouted wheat. Haphazard use of sprouted wheat for blending should, however, be avoided, since too high a percentage imparts runny dough characteristics. "Diastating" flours, by the addition of small quantities of malted wheat flour, is now a common practice by United States and Canadian millers since by this means any desired gassing level can be easily obtained. On account of the hazard of including too high a percentage of badly sprouted wheat in a mill mixture, the grain inspector invariably views with disfavor all samples of sprouted wheat since it is difficult if not impossible to determine the extent of sprouting at the time of inspection.

(c) Spring Threshed Wheat - In some years, considerable quantities of spring threshed wheat are received for inspection; wheat of this character is heavily bleached and sometimes sprouted, and continued exposure to wet and snow generally results in a lowering in bushel weight and in severe cases the flour yield is also reduced. Provided the protein level of such wheat is sufficiently high, baking quality is often quite satisfactory. Since, however, most of the spring threshed wheat originates in northern Alberta where the general level of protein is low, deficient protein content, rather than severe bleaching, is frequently the cause of inferior baking strength.

Rusted Wheat - In years when rusted wheat is harvested in large quantities, special grades Nos. Four, Five and Six are set up by the Western Grain Standards Committee to provide for sound wheat of low weight per bushel. Wheats of this character give low yields of flour of high carotene content, but the baking strength is invariably high. In 1935, when a preponderance of rusted wheat was harvested, numerous samples were submitted for inspection comprising both thin rusted and plump frosted kernels. The milling and baking characteristics of rusted and frosted wheats are so different that from the millers' standpoint it is undesirable that they should be mixed. The overseas miller, who is accustomed to purchasing Nos. Five and Six as "fillers", would find that mixtures containing rusted wheat would lower the flour yield and at the same time add strength to the blend; it would therefore be extremely difficult for him to maintain uniform flour strength since the percentages of rusted wheats would vary in different shipments. Aside from this, difficulties in cleaning and conditioning would arise were these two types not treated separately.

In order to clean the heavy component of such a mixture, heavy air draughts would be necessary and this would remove excessive amounts of light-weight wheat, thus rendering the screenings loss quite high. Under these circumstances, a compromise would have to be effected by cleaning the wheat less thoroughly and such compromises are not desirable. From the standpoint of preparing the wheats for milling, both the overseas and Canadian miller would prefer to treat the two types separately and it is quite likely that those mills having the necessary facilities, would carry out separately the first stages of milling these thin wheats.

As regards the general effect on milling and baking quality, damaged wheats of Canadian origin may be roughly classified into three groups; those which, while injured in appearance, possess high intrinsic value (bleached, bran-frosted, rusted and possibly "brassy" colored kernels); those which were injured in both appearance and quality (severely frosted and immature) and those which, although damaged in appearance, are valuable for special purposes in certain crop years (sprouted).

Wheat Damaged by the "Wheat Bug".- Considerable interest has been evidenced lately in the presence of "wheat-bug" damaged grains in certain wheats, and when the damage is fairly extensive, the gluten during fermentation becomes soft and slimy and the dough characteristics are appreciably deteriorated. The areas in which infection may appear have become more extended (France, Germany, Russia, Morocco, Persia and Danubian countries), and this has presented an acute problem to millers in Great Britain, owing to the fact that this year considerable quantities of bug-infected wheat from the Danube basin and adjoining areas and also from Russia have been imported. So far, bug-wheat infection has not been encountered in the United States of Canada.

According to authorities who have investigated the problem, there are a number of different insects which are able to affect wheat in this way and they belong to either of the Aelia or Eurygaster genera of the family Hemiptera. The insects are fawn in color, vary in size according to species, and normally range from one-third to one-half of an inch in length. The insects possess a proboscis with which they are able to puncture the grain when it is in the milk-ripe stage; they bore into the kernel and inject a saliva which has marked enzymic properties. This saliva is reported to be strongly proteolytic in nature and some claim that the starch is also affected. The damage is difficult to detect, since the almost microscopic puncture is all that is visible in the ripened kernel. The fact that the injected liquid is enzymically active is the reason why the presence of a high proportion of infected grains may be of serious consequence. The trouble is not restricted to the fact that the protein of the infected wheat is already ruined but as an appreciable quantity of the causative enzyme is still present, admixtures of such wheat with normal wheat may have a serious effect upon the sound protein of the uninfected portion of the grist. As little as 2% of infected kernels is reputed to cause serious injury to quality.

As regards the effect on baking quality when only an occasional kernel is infected, the extent to which the gluten becomes sticky during baking will be too slight to have any detectable effect on the dough; in badly contaminated samples the dough becomes noticeably wet and sticky and has a decided tendency to flow. The resulting bread is said to have a thick crust, small volume, heavy soggy crumb and poor keeping qualities.

Attempts have been made in England recently to develop baking formulae whereby good bread can be made from "bug wheat" flour, with the result that the extreme runny nature of the dough can be overcome to a considerable extent by employing approximately one pound of acid calcium phosphate per sack of flour. This procedure is reported to permit using at least 20% of badly damaged wheat in a baker's grist without noticeable deterioration in dough strength.

In the few abstracts that have appeared in English regarding these "bugs", they have been referred to as both "cereal" and "wheat" bugs and since their activities are not necessarily confined to wheat, the former appears to be the more suitable name.

Seed Grades Committee

This Committee met at the call of the Chairman on Friday, October 7th, in the office of A.C.Heise. The following matters were discussed:

1. The Seeds Act.
Main Changes in Regulations for 1938-39 Season.

Table 2, page 18: Rye is added to kind of seed for certification.

Grade Certified No. 1 seed formerly was allowed not more than one secondary noxicus weed seed per peck except flax, which was one per pound - changed to allow not more than one secondary noxious weed seed per 2 pounds except for flax, which may contain not more than one per 2 ounces. (Standard lowered).

Hemp has been deleted from the Seeds Act.

Table 3, page 19: The larger field seeds are allowed 75 and 150 seeds of other crops per pound in grades 1 and 2 with the exception of oats and barley, which are allowed 150 and 250. Rye is now also made an exception, and allowed 150 and 250 seeds of other crops per pound.

Tables 4, 5, and 6: Minimum percentage of pure seed is now specified.

Table 5, page 21: Crested wheat grass is added to kind of seed for certification.

Maximum sweet clover seed formerly allowed in certified forage crop seed was one per ounce - changed to allow 2 and 5 per ounce in Certified No.1 and No. 2. (Standard lowered) Registered now 1 per ounce - formerly 1 per 2 ounce. Table 4.

Table 6, page 22: Sorghum and Sudan grass were formerly required to test to minimum percentage pure living seed of 75, 65 and 55 in grades 1, 2 and 3 - now are changed to require a germination percentage of 80, 70 and 60. (Standard changed).

Wild oats in certain commercial forage crop seeds were formerly limited to 1, 5 and 20 per ounce in grades 1, 2 and 3. This provision is now deleted, which allows 5, 20 and 75 secondary noxious weed seeds respectively. (Standard changed).

Table 7, page 24: Forage crop seed mixtures were formerly allowed 100, 200 and 300 total weed seeds per ounce, grades 1, 2 and 3 - changed to 0.8, 1.5 and 2.5 per cent respectively. (Standard lowered).

Mixtures formerly required a minumum of 8, 6 and 4 per cent seeds of other crops in grades 1, 2 and 3 - changed to 5 per cent in all grades. (Standard changed).

Mixtures formerly carried no specific limitation of sweet clover seed - changed to 50 and 100 seeds per ounce in grades 1 and 2, and 3 per cent in grade 3.

Note: Sweet Clover seed may not be named as an ingredient of a mixture since it is specified as a weed seed on Page 37, but is graded only when offered for sale as pure sweet clover seed. (Standard raised).

Mixtures in which only one kind exceeds 5 per cent but two or more combined exceed 5 per cent - the kind exceeding 5 per cent singly shall be named and the word "mixture" appended - e.g.- Alsike Mixture.(Standard changed).

A Control Sample Certificate may be issued for a mixture when the grade, certificate number, and percentage of each kind are stated.(New provision).

A mixture containing kinds of seed included under both Tables 7 and 10 shall be graded under Table 7 unless sender requests a grade under Table 10 as a lawn grass mixture.

Former Table 9: Turf grasses deleted. These grass seeds are now graded under new Table 9, page 27.

Table 9, page 27: For turf and forage grass seed maximum secondary noxious weed seeds per ounce was formerly 75, 150 and 300 for grades 1, 2 and 3 - changed to 50, 100 and 300. (Standard raised).

The fine grasses formerly were allowed a maximum 5 per cent seeds of other crops - changed to 2, 3 and 5 per cent for grades 1, 2 and 3. (Standard raised).

Blue grasses and red top formerly carried a more restricted weed seed content than other fine grasses - changed to conform. (Standard lowered).

Table 10, page 28: For lawn grass mixtures a Control Sample Certificate was formerly issued when sender stated the grade, certificate number, and percentage of each kind of seed - changed to require a Registration Control Certificate. A Control Sample Certificate is now issued on analysis and test of a sample.

Table 13, page 32: Germination of certain vegetable seeds has been changed to require 10 per cent lower minimum germination. Celeriac and celery are now 55 per cent. Beets, egg plant, mangel and Swiss chard are now 65 per cent. Cucumber, melon, all onion varieties, and tomato are now 75 per cent.

Section B, page 33: The conditions under which brand names and Registration Control numbers may be used are changed.

Section C, page 34: Darnel is changed from secondary noxious weed, Class 4, to primary, Class 2. Winter cress (Yellow rocket) is changed from "other weeds", Class 6, to secondary noxious, Class 4. Hop clover (Trifolium Rubium) is specifically deleted from "other weeds", Class 6. Toad flax is added to "other weeds", Class 6.

Section D, page 38: Is amended to read:"The established variety names of cereals, potatoes, forage crops, lawn or turf grasses shall be those prescribed in Appendix A, page 62 of these regulations. The procedure to be followed in obtaining a license for a new variety name under the provisions of Section 8 of the Act shall be to submit a description of the variety, its history or origin and a sample of the seed to the Plant Products Division of the Department of Agriculture, Ottawa, Canada. The test for license shall be conducted by the Dominion Agrostologist, the Dominion Cerealist, the Dominion Horticulturist, or other plant specialists authorized by the Minister, and the license issued by the Director of the Experimental Farm."

Subsection 2, page 46: Is changed to provide specifically for appeals against inspections, paragraph (a), to the Head Office, C.S.G.A., and Paragraph (b), to the District Supervisor, Plant Products Division.

Subsection 4, page 52: The requirement that red clover seed grown in Great Britain must be stained yellow is deleted.

Section J, page 57: Seed graded for export from Canada was formerly required to be free from dodder - changed to be free from prohibited noxious weed seeds.

Page 59: Export grades formerly carried a maximum percentage of certain prescribed injurious weed seeds - changed to primary and secondary noxious weed seeds, Classes 2 and 4.

Appendix A, page 62: Certain variety names are added and others are deleted. Regulations governing the use of hybrid seed corn are set up.

The Committee recommends that the maximum limit of secondary noxious weed seeds in grades for Certified seed under Table 2, page 18, be restored to the 1937-38 standard.

NOTE: Grade Certified No.1 is now allowed not more than one secondary noxious weed seed per 2 pounds. (Formerly not more than one per peck) Secondary noxious weed seeds include Ball mustard, Canada Thistle, Cow cockle, Dog mustard, False flax, Field peppergrass, Hare's-ear mustard, Night-flowering catchfly, Poverty weed, Purple cockle, Russian thistle, Stickseed, Stinkweed, Tumbling mustard, Wild Oats, and similar weeds. By this change Certified No. 1 wheat may contain 60 such weed seeds per bag, Certified No.1 oats 51, and Certified No.1 barley 48, which is too many for certified grades. There is also insufficient distinction between Certified No.1 and No.2, since Certified No.1 allows one per 2 pounds, while Certified No.2 allows one per pound.

The Committee points out that the maximum limit of sweet clover seed in seeds of other forage crops is 50, 100 and 200 per ounce in grades 1, 2 and 3, and in mixtures of other forage crops is 50 and 100 per ounce in grades 1 and 2, and 3 per cent in grade 3, and that there is no provision for grading forage crop mixtures containing over 3 per cent sweet clover seed, and desires discussion of this.

2. Canadian Seed Growers' Association.
Production of Elite Stock Seed.

At the 1938 Annual Meeting, a committee appointed to consider ways and means of possible assistance to producers of Elite Stock reported as follows:

"Owing to the introduction of new varieties in recent years, many of our best producers of elite stock have found themselves in unexpected difficulties by reason of the fact that the variety, upon which they had spent much time and energy in raising to elite status, had almost suddenly become displaced by newer and more suitable varieties.

"Under the existing procedure required to be followed to produce elite stock seed from a new variety, a grower who had decided to abandon the production of elite of an unsuitable variety, would probably have no elite seed and so no first generation seed of the new variety he might select to work with, for a number of years.

"In order to protect our producers of elite stock, and to assure that experienced producers of elite stocks might be able to continue with the least interruption possible in their operations of producing elite stock, it is recommended that the following two amendments to the present required procedure of producing elite stocks be adopted, and that the Committee on By-laws and Regulations make such changes in the regulations of the Association as will make the regulations conform to these proposals, and to be effective at once:

1. "In the case of new varieties accepted for registration from and including the year 1936, the sole method of producing elite stock shall be by the multiplication of foundation stock supplied by the C.S.G.A.

2. "In the case of varieties which originated in another country, the C.S.G.A. shall have the right to designate the institution which shall produce foundation stock accredited by the Association of any particular variety."

This report was adopted by the Association.

Production of more than one variety on the same farm.

The Committee on By-laws and Regulations reported as follows:

"The Committee, after considering the situation resulting from the rescinding of Regulation 20, C.S.G.A. Circular No. 6, recommends:

1. "That in the revision of Circulars Nos. 6 and 12 a paragraph be included pointing out that the growing of more than one variety of the same kind of crop by a grower is extremely risky.

2. "That in the revision of Circulars Nos. 6 and 12 the attention of the grower should be called to By-law 5(c) which places upon the grower the responsibility for maintaining the purity of his stocks and of accepting financial responsibility for losses resulting from contamination.

3. "That in the revision of Circulars Nos. 6 and 12 attention should be called to the fact that, by the adoption of the report of a special committee at the 1937 Annual Meeting, the Association has authority to take samples or otherwise to conduct investigations or tests of all or any seed offered by the grower for sealing, and also to obtain under affidavit such information as may be considered necessary.

4. "That the Association at its discretion shall make provision for purity tests of samples taken from all seeds offered for sealing."

The report was adopted.

Circular No.6 has since been published implementing this report, as follows:

21. "The use of more than one variety of the same kind by the registered seed grower involves a risk of contamination of stocks, even with the most careful supervision and practice. For this reason, the Association does not favor the use of more than one variety of the same kind of crop by seed grower members, except in special unavoidable circumstances that make necessary the use of more than one variety for a short period, and such practice is considered essential to the progress of pure seed growing. It is recognized that, as a new variety is introduced, the registered seed grower must begin using the new variety in some instances for a period of time before it is possible to discard the variety which is being replaced. Thus in recognizing that the producing member must change from one variety to another, the Association does so on the grounds that here is an adverse circumstance which is bound to exist if the service rendered by the Association is to be kept in line with the progress being made by our plant breeding institutions. The position of the Association in recognizing the need of the bona fide seed grower is very different from approving the action of a grower who merely wishes to multiply additional varieties so that he may cater to a wider market. In the registration of stocks where a grower is using more than one variety of the same kind, the Association will be guided by the powers given through the following by-law:

> "It shall be the duty of any member who is producing any plant propagating stock for registration...to follow safe seed production methods and take the proper precautions to preserve the purity of plant propagating stock; to make available to the Association as and when required information concerning his seed production methods; assume financial responsibility for losses resulting from variety or strain mixtures if and when it is established by investigation of the Appeal Board of the Association that such mixtures are the result of faulty seed producing practices of the member. The findings of the Appeal Board shall be final."

26. "The purity of all registered stock must be verified after such stock has reached the fifth generation and subsequently at intervals not exceeding three years. Failure to comply with this regulation will lead to the disqualification of the stocks for registration purposes. This means that the grower of registered

stock shall, upon request, furnish from his fifth and any succeeding generations a representative sample of not less than eight ounces of seed to be used for verification purposes. In addition, the Association reserves the right to secure samples from any stocks sealed as registered for verification purposes, and to arrange for the verifying of such stocks for purity at such times and places as may be deemed necessary by the Association."

3. Your Committee has studied the question of the sale of unlicensed varieties of cereals from farmer to farmer.

It has been brought to the attention of the Committee that farmers in certain sections of Manitoba have been distributing seed of an unlicensed variety of wheat, No. 123, representing it to be Renown wheat. This Committee referred the statement to the District Supervisor, Plant Products Division, with the request that it be investigated and such action be taken as deemed necessary in the interests of agriculture and good seed growers. It was noted that Section 15 of the Seeds Act exempts farmers from the provisions of Sections 5 and 6 only upon delivering seeds of cereal grains, etc., for seeding by the purchaser, but that Section 7 governing the use of an established variety name, Section 8 governing the licensing of a variety name, and Section 9 governing the false representation of seeds or plants as to age, viability, quality, grade, variety, origin or description, advertised, offered, sold or had in possession for sale for the purpose of seeding or planting in Canada, apply in all cases without exemption.

4. In the past it has been noted that seed distributed for relief purposes is composed of mixed varieties or varieties unsuited to the district concerned, or varieties not recommended for the production of quality or yield, while at the same time seed of approved varieties was available, thereby creating a situation in which the work of one Department which has been promoting the use of good seed was not supported by another Department.

The Committee recommends that seed supplied for relief purposes be of a recommended variety and suited to the district concerned, and also that such seed be inspected by the Plant Products Division for suitability of variety, weed seed content, and vitality before distribution is authorized. Your Committee feels that this matter is now very important, especially since the introduction of rust resistant varieties of grain.

5. The Committee notes that regulations under the Seeds Act governing the sale of seed of the current year are not published until after a considerable volume of seed has been moved, causing confusion and in some cases loss due to changes in grade. The Committee suggests that a resolution be considered to the effect that regulations under the Seeds Act be published not later than the first day of September in each year.

Farm Management Committee

INTRODUCTORY STATEMENT

By H.J.Siemens.

This is the first time in the history of the Manitoba Agronomists Association that a report has been presented on the allied subject of farm management, although, indirectly, this subject has frequently entered into the discussions at previous conventions.

Your first Farm Management Committee recognizes that the inclusion of this subject in your convention program was agreed to at your last convention with a certain amount of hesitancy and reasonable doubt. It was felt by some that the subject of farm management was too wide and all inclusive, and would lead the convention away from the special subject of agronomy, for which it is specifically organized. Our committee wants to express its appreciation of this danger at the outset; and to avoid this danger it is our intention to raise, and bring up for discussion, only such points as are definitely related to the general subject of agronomy. Apart from a few introductory remarks, in which I shall try to briefly outline the inter-relation of agronomy and farm management, we propose to confine our report to the phase that deals directly with field crops management.

The estimated net average annual agricultural production for the years 1933 to 1937, both inclusive, for the Province of Manitoba, as reported in Crop Bulletin #116, is $51,412,000. Of this total $28,832,000, or 56%, came from field and garden crops, (less seed and feed used on farms where produced) and the remainder of 44% came from livestock and livestock products.

The value of Manitoba farm property for the year 1936 is reported as $301,542,660. Of this total $153,219,000 - or about 51%- represents land, and the remainder of 49% represents buildings, improvements and livestock.

Thus, the term agronomy, which deals with all field and garden crops and the land upon which these crops are produced, covers slightly over one-half of the total agricultural production and agricultural wealth in Manitoba, and it is therefore reasonable to assume that at least half of the farm management problems arise in the field of agronomy. We believe that this is sufficient evidence to show that agronomy and farm management have enough in common to make it mutually worthwhile to have very intimate association.

Farm management has been defined as "The application of sound principles in the selection, organization and conduct of an individual farm business for the purpose of obtaining the greatest possible profit."

The practical test of farm efficiency, however, is whether the people operating the land are earning sufficient to maintain a reasonable standard of living. Not total production, but net farm income, is the final yardstick. The chief contribution any farm management committee can make is to ever keep before us the net cash results of agronomic enterprises. In the last decade we have had an indication of what it means to produce

crops without financial profit, and also failing to produce crops that could have netted profit. Both situations constitute a challenge to the agronomists and the farm manager.

In viewing this subject of farm management, or field crop management, your committee has approached the matter from three different angles:

1. The varietal and cultural (production) problems on the individual farm. This will represent agronomy as viewed by the individual farmer, and will be presented by Mr. J.E.Crawford, under the title of "Field Crop Management Problems on the Individual Farm."

2. The financial or economic effects of agronomy. This is agronomy as viewed by the business farmer. Field crops converted into cash, and what do they look like? There is a vast difference between them and the monthly salary cheque. This angle will be presented by Mr. J.R.Racine, under the heading "Importance of Field Crops in an Analysis of Basic Land Value."

3. The third angle is that of human psychology and educational factors involved, and this represents agronomy as viewed by the professional agriculturist engaged in extension, organization or group farm management work -- the research agronomist with valuable information on one end and the actual farmer just as he is on the other end. The practical value of the work of the one depends on his understanding of the problems of the other. The opportunities of these two to meet on common ground are limited, and often they speak different languages. The professional agriculturist is in between. He serves as interpreter, teacher, confidence-man and, often, business manager. How can he become more efficient in the chain of converting agronomic research into financial and human profits?

Mr. E.F.Chilcott, Senior Agriculturist, Division of Dry Land Agriculture, U.S.Bureau of Plant Industry, in his pamphlet, "Preventing Soil Blowing on the Southern Grain Plains" expresses the opinion that - "the serious aspect of the soil drifting problem is not so much the lack of many adequate solutions <u>but merely the necessity of finding means to bring about the large scale adoption</u> of proven preventive measures."

In the report entitled "Rain and Drought in Western Canada," by Mr. William Sellar, as submitted to Sir Edward Beatty, President of the Canadian Pacific Railway Company, in October 1937, in which he devotes one section to the work of the P.F.R.A., we find the following statement: - "The biggest handicap to P.F.R.A. is the age old problem of <u>Farmer psychology</u>."

This angle of our report will be presented by Dr. H.B.Sommerfeld, under the heading of "Getting the Message of Field Crop Management over to the Farmer."

<u>FIELD CROP MANAGEMENT PROBLEMS ON THE INDIVIDUAL FARM.</u>

Presented by J.E.Crawford.

The complexity of the problems that arise in the management of field crops on the average farm is determined by the thoroughness of planning the entire farm program.

In planning field crops the following points must necessarily receive primary consideration:--

1. Suitability of the soil for the crop intended.

2. Timeliness of tillage methods used to prepare the seed bed.

3. Thoroughness of tillage methods used in preparation of the seed bed.

4. Varieties and rate of seeding.

5. State of repair of the farm implements, with special emphasis on the efficiency of the seed drill and grain cleaning equipment.

6. Cultural practices to be followed after seeding.

In view of the fact than on many Manitoba farms the tillage of fields, whether for summerfallow, partial fallow or second crop, is not done at the proper time, and the methods used are inefficient, your committee are of the opinion that these points are worthy of the consideration of this convention:

SUMMERFALLOW:

The reasons that a large percentage of arable land is fallowed each year may be listed briefly as follows:

1. To conserve soil moisture.

2. To make plant food more readily available for succeeding crops.

3. To destroy weeds.

4. To distribute field operations over the entire summer season.

Complete summerfallows require cultivation as follows:

1. Fall Tillage:

2. Spring Tillage:

3. Summer Tillage:

PARTIAL FALLOW:

Early summer plowing followed by timely cultivation is essential.

Points that will assist the farm manager to plow partial fallow fields early are:

1. Sow an early variety of sweet clover.
2. Cut clover with binder but do not tie into sheaves.
3. Cut the clover crop with a binder, tie into sheaves and follow binder with the plow and stook the sheaves on the plowing.

PREPARATION OF LAND FOR SECOND CROP:

Early fall plowing on heavier soils has the following advantages:

1. A late warm fall with sufficient moisture may germinate a percentage of annual weed seeds.

2. Perennial weeds, such as Sow Thistle, are more easily controlled by August plowing.
3. The soil is in better condition to receive and store soil moisture.

In view of the importance attached to efficiency and timeliness of field operations, considering that almost one-quarter of the arable land in this Province is summerfallowed each year, and that the cultural methods used for both summerfallow and second crop fields are not generally well done, your committee recommends that greater publicity as to the value of sound cultural practices be given by way of summerfallow demonstrations throughout the season, by radio and by press.

We suggest that this convention set up a tillage publicity committee, which would collect the important experimental data on desirable tillage methods already available at different experimental farms; supplement same by local demonstrations and observations, and conspicuously compare the good with the undesirable by commonly practiced methods, and systematically bring them to the attention of the average farmer. It is assumed that such a committee, if appointed, would work in closest harmony with the Extension Service.

SWEET CLOVER:

Sweet Clover is recognized as valuable feed for livestock and also a green manure crop on the heavier soils, and its production should be encouraged on more Manitoba farms. There is the problem, however, of clover plants appearing in the succeeding grain crops. This may be due to insufficient moisture to germinate the seed, the use of unscarified seed, or delayed plowing after a hay or seed crop. This volunteering has caused many farmers to relegate sweet clover to the category of a weed. In our opinion this volunteering need not be a serious problem, but it is thought that agricultural workers should direct their attention to finding the possible cause of this habit on the individual farms, with a view to increasing, rather than decreasing, acreage devoted to sweet clover production.

BARLEY:

Your committee fully appreciates what has been done by research workers with improved wheat and oat varieties and the introduction of some of the varieties of barley. It would appear, however, that there is need for a barley that will more nearly suit the conditions in the areas in the Province where this crop is successfully grown. The varieties O.A.C. 21, Garton, Mensury, Wisconsin 38 and Trebi have merit, but all have some characteristics which lessen their adaptability for Manitoba conditions. As barley has and will continue to fit into a crop program on the average Manitoba farm, we believe that work already begun with the breeding and selection of new varieties is of great importance to grain growers.

Suitable barley should have characteristics of:

1. High yield.
2. Rust resistance.
3. Early Maturity.
4. Strength of straw.
5. Quality of grain suitable for malting purposes.
6. Preferably smooth awns.

THE IMPORTANCE OF FIELD CROPS IN AN ANALYSIS OF BASIC LAND VALUES.

Presented by J.R.Racine.

The rural appraiser of old based his judgment of value largely on the appearance of the farm and upon the comparison of it with other farms which were recently sold in the community. Certain modifications of this system occurred from time to time, all of which departed little from the main idea. That practice prevailed during the years of the development of this western country. Many good appraisals were made, but the lack of uniformity brought a great variety of results. Boom prices shadowed errors of the appraiser but the depression revealed the weaknesses and irregularities. As a result, the appraisal of land came in for more serious study.

Divergent views as to how appraising should be done made general agreement a faint hope, but out of the study and working of experts the American system was created.

The American system is not without its critics and is not, as yet, generally accepted as the ideal way to appraise land. No doubt it will be subjected to further adjustment, more particularly in the detail of which it is composed. So far as the fundamental structure of it is concerned, it represents a very complete and thorough method of arriving at the basic value of a rural property.

An appraisal, at best, is an opinion. Under the American system however, the approach is a step by step analytical process in which known facts are given their proper effect, enabling the formulation of a logical conclusion.

Value flows from three major sources, namely:

1. Earnings.
2. Other commercial or locational uses, and
3. Non-commercial or home uses.

In this paper we are concerned with earnings or income value, that is, what the land will produce. To properly measure this source of value the appraiser must be able to identify the soil. For that purpose he will make himself familiar with soil surveys and soils studies reports covering that locality. He will thoroughly inspect the soil on the farm so that minor variations which do not show up in a large scale survey, can be found.

Through his own personal knowledge of the land, and with the use of data as to crop yields, the appraiser establishes what the yields will be under typical operation. In order to avoid the effect of different yields each year, the appraiser usually takes a moving average covering a period of from five or ten years. Averages of the prices netted by the farmer are also taken for similar periods, and from that the amount of returns from a farm can be established. The object in establishing the amount of those returns is to determine the money which will accrue as rent to the owner of the property. From the rent the owner's expenses are deducted and the balance is capitalized at a chosen or established interest rate, thus giving the value of the property due to earnings.

On the following page is a detailed account of this process as it applies to a farm on the Portage plains.

INCOME CAPITALIZATION - EARNINGS

Crop or Source	Acres	Yield per acre	Total Yield	Price	Value	Rental share	Owner's Part
1.Wheat	200	18 bus.	3,600 bus.	$ .80	$2880.	1/3	$ 960.
2.Oats	100	30 "	3,000 "	.34	1020.	1/3	340.
3.Barley	65	23 "	1,495 "	.36	538.	1/3	179.
4.Flax	35	7 "	245 "	1.38	338.	1/3	113.
5.S.Clover	50	2½ tons	125 tons	1.25	156.	Nil	-
6.Summerfallow	150						
7.Pasture	30	...	...	.50	15.	Nil	-
8.Buildings	10						
Total Acres	640	Owner's Total Gross Earnings $1,592.					

EXPENSE-Under Typical Management Over Period of Years:

1. Real Estate tax at 25¢ per acre.....$177.16
2. Special Tax(drainage continuous)..... 137.98
3. Insurance, rate Coverage %..... 76.00
4. Maintenance, Buildings %, fences, and other imprv. 120.00
5. Management..... 25.00
6. Fertilizer.....Seed.....
7. Baling, threshing, shelling, delivery charges, etc..

Owner's total expense.....$536.14

Owner's Total Gross Earnings	$ 1,592
Owner's Total Expense	536
Owner's net earnings	$ 1,056

Income Capitalization Value when Capitalized at 6%..
$17,600.00

Having obtained the income capitalization value, it now remains to have the adjustments for location and other economic and home uses, known as comparative adjustments, made.

Plus or minus values are given through the detail of the report where location and home used are considered. The net effect of these values are subtracted from or added to the Income value, as the case may be, giving the basic value.

At the outset it is clear that the income value is the main-spring in the appraisal of a Manitoba farm. In it we depend on what the land will actually produce and that in the consideration of yields we have the yardstick which shows what the earnings are.

The importance of field crops in arriving at basic value is quite obvious. The land's ability to produce determines its value as shown through the earnings calculation or the first major source of value. That ability to produce depends on the varieties of crops which can most suitably be grown. The improvement of adaptable crops therefore tends to gradually increase the value of land. The breeding of rust-resistant wheats has increased yields and will tend to raise the average over a period of years which will, in turn, add to the value of property. Great credit is due the research workers for the breeding of superior grains. Rust-resistant wheats alone have contributed thousands of dollars in increased earnings to the Manitoba farmers.

To illustrate further the importance of the field crops in obtaining a basic value of a farm, consider that the growing of rust-resistant wheat had increased the average yield per acre by one bushel; i.e., instead of the 18 bu. average use a 19 bu. average. At the same price the returns for wheat will be $1013. instead of $960. The total gross earnings will be $1,645, instead of $1,592. The expense being the same, the total net earnings will be $1,109, instead of $1,056. When this is capitalized at 6% it gives a total of $18,480, an increase of $880 over the first value; an increase of almost $1,000 as a result of an increase in yield of one bushel per acre. On the other hand, supposing in the first instance that instead of 80¢ per bushel, the price was 75¢ per bushel because of smutty wheat. The yield being the same the earnings from wheatwould be $900, cutting the total net earnings after expenses were deducted to $996. When this is capitalized at 6% the income capitalization value is $16,600, or exactly $1,000 below the first price, cutting the value of that farm by slightly over $1.50 per acre.

These examples are definite proof of the importance of maintaining a high standard of efficiency in agronomic production. Any accomplishment as a result of research and study which tends to improve efficiency and quality in the production of field crops likewise tends to increase or strengthen the value of a Manitoba farm.

RECOMMENDATIONS:

The calculation of the income value of farm property in Manitoba would be aided greatly if a more accurate record of yields could be made available. Smaller reporting areas would be of great assistance in that respect.

GETTING THE MESSAGE OF FIELD CROP MANAGEMENT OVER TO THE FARMER

Presented by H.B.Sommerfeld.

The psychology and philosophy of the farmer is basically the same as that of the average citizen. It is influenced by environment. The outlook of the farmer varies in its emphasis depending upon his economic and social experiences and his understanding of the problems of those engaged in other walks of life in the immediate community and elsewhere. It varies with his relative success of failure in securing those things every normal human being wants. Among these are:

1. Health and the preservation of life;
2. Food;
3. Sleep;
4. Life in the Hereafter;
5. Security, or money and the things money will buy;
6. The well-being of his children;
7. A feeling of self respect or importance in his community.

Health and the preservation of life depend upon heredity, environment, diet and habits of living. These are primarily problems of the home. Without their solution, life would soon become impossible.

To secure sufficient food of the right quality is not so difficult a problem for the farmer, even in most destitute circumstances, as it is for the urban dweller. The farmer can produce much of his own food on the farm at a minimum of cash outlay to himself.

Sleep comes to anyone who is healthy, has a clean conscience and a tired body. Farmers as a group, while early risers, sleep soundly.

The want of a life in the Hereafter is being administered to by the clergy. Their work can best be endorsed by men in professional agriculture by living and dealing with their fellow men strictly in accordance with the Golden Rule.

Security, or the want of money and the things money will bring, is common to all normal men and though often over-emphasized, is the basis of much social unrest. It is not peculiar to rural life and is often the subject of discourse from the best pulpits. The lack of money in the industry of agriculture as a whole in Western Canada during the past half decade is now causing serious national economic distress. The industry over the past quarter of a century has on the whole prospered. Violent economic and climatic fluctuations have, however, always resulted in disaster to those inclined to risk too freely on the immediate future. The want of things money can buy rouses farmers to improved production methods. This creates a demand for the service of the practical man trained in agriculture.

The farmer as well as men in other walks of life is interested in the well being of his children, and the assurance of a satisfactory future for them. It is a fertile field for the work of those trained in agriculture to develop and lead the farm boy or girl to a true appreciation of life on the farm and its advantages. It is the ambition of every farmer whose boys and girls plan to make a life work of farming to provide them with a better understanding of the business of farming, so that they may avoid at least a few of the very real difficulties he has encountered during the past twenty-five years.

The farmer maintains his feeling of self respect and importance through his relations with his neighbors and other citizens of the community. His success in satisfying this want depends largely upon sound financial progress, his personality, capacity to inspire confidence and to enjoy his fellow men. Honest and sincere praise of work well done constitutes an avenue through which a feeling of self respect may well be stimulated.

Farmers and the farm business are peculiar in a number of respects. Farmers generally maintain greater independence of action and thought than do those engaged in urban activities. The farmer is individualistic in his outlook, and the fact that he is for the most part a lone worker is reflected in his thought and action. Farming is not only a business but a way of living. Business competition is not so direct or obvious to the man on the farm. There is great variation in capacity to perform work, both as to quantity and quality. The misfits remain in the farming business for a longer period than do those engaged in other types of business, the result of which is reflected in a lower

standard of living gradually having to be adopted, and the elimination process is more drawn out and more painful. For the volume of business transacted, the farmer displays less method and accuracy in the keeping of business records than does the average individual engaged in other lines of business.

To farm is a way of living. It is a family enterprise. All members of the family of working age contribute to the performance of the work on the farm and are therefore vitally interested in what is being done. Greatest success in working with farmers is therefore obtained by an approach through as many of the family members as possible. It should be kept in mind, however, that the father is, or usually aspires to be, the family head. A careful study of the co-operation in each family is therefore necessary, and individual cases will vary greatly. Opportunity frequently presents itself to stimulate family team work and through it a solution to the problems of improved farm operation may be found.

Farmers generally prefer to maintain relative independence of thought and action in the management of their business and farming operations. Changes coming from outside direction are therefore sometimes slow and difficult to bring into effect. The farmer, like men engaged in other work, is, however, open to suggestion. His confidence must first be won, after which suggestions tactfully given, if sound and practical, are usually acted upon. Future progress in this direction is most rapid if credit is given to the operator himself for any change brought about. Sincere praise should always be offered in appreciation of progress resulting from change in management or workmanship. This will stimulate financial advancement and build up the morale and self respect of the farmer, both of which are important in successful farm management.

Tact, sincerity of purpose, capacity to take what on the surface seems abuse, all contribute to pave the way to happy and successful results in getting the message of better farming over to the man on the land. It is important that direct contact with the farmer be left to the trained worker with a "dirt farmer" background. All other things being equal, he has the advantage of appreciating to the fullest extent practical farm problems as they present themselves. These problems vary from year to year and from farm to farm.

To make the best possible use of all available scientific data pertaining to field crops is a problem. To do this intelligently on a large group of farms requires a working knowledge of all basic sciences, including human psychology. These are applied through the media of agronomy, animal science, agricultural engineering and farm management.

To convey the message of the scientist and his co-workers to farm operators is a problem of further importance. To make full and intelligent applications of the findings of the scientist to the farm problem itself requires tact, patience and persistence. Sometimes it is lack of knowledge to do, at other times it is lack of will to do, that is responsible for faulty workmanship, either of which lead to disaster and failure on the farm.

It is the responsibility of every individual engaged in the betterment of agriculture that his or her contribution be designed toward a solution of these problems.

Agricultural colleges and extension workers are to be complimented upon the recent inclusion of farm management under a separate division as a part of their message to farmers. Much of the economic disaster among farmers of Western Canada is due to a lack of understanding of farming as a business.

It is desirable to understand how to grow field crops, livestock, how to care for machinery and to have an appreciation of the sciences underlying these activities. To over-emphasize one of these or to fail to organize them all to the best advantage to suit a given environment has resulted in disaster, or near disaster, for many operators during the past decade. It is more than luck or good guessing that has maintained a few individual farmers in every community solvent even during the depression. This is due to sound farm management, the principles of which should be studied diligently by all who farm, both young and old alike.

Sincere commendation is offered to all workers in the field of agriculture. It is a task devoted to a most worthy cause. In Western Canada especially a large percentage of the population is dependent upon the success of the farmer. It will be conceded, that without reflection upon any group or individual, Federal, Provincial, or private worker in this field, congratulations are in order to the diligent research work accomplished and under way in the Dominion Rust Research Laboratory. Rust-resistant wheats have netted Western agriculture handsome dividends during the past few years, sufficient to cover all the cost of agricultural research, teaching and extension since Dr. Goulden made the cross that resulted in Renown wheat in 1926.

In conclusion, it is recommended and urged that research in, and the teaching of farm management, be further extended and expanded by Federal and Provincial authorities, so that the basic reasons for the success of the successful farmer may become better known and Canada's national advantage as a producer of agricultural products may thereby be improved.